

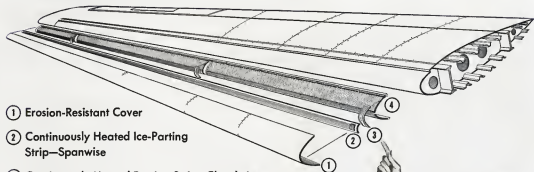
AVIATION WEEK

A MCGRAW-HILL PUBLICATION

MAR. 5, 1951

\$6.00
A YEAR

TYPICAL DIAGRAM OF GOODYEAR ELECTRO-THERMAL ICEGUARD



- ① Erosion-Resistant Cover
- ② Continuously Heated Ice-Parting Strip—Spanwise
- ③ Continuously Heated Parting Strip—Chordwise
- ④ Cyclic Heated Ice-Shedding Area

New “hot rubber” Iceguards

eliminate icing hazards

GOODYEAR Electro-Thermal Iceguards, new product of ten years' research, will bring new safety to flying by eliminating wing icing.

Lacking the complexities of old methods, and far more dependable, this new “heated rubber” fits like a glove and is easily adapted to various wings, props and other airfoil sections. It can also be applied to antenna masts, ducts and varied parts requiring ice protection. Another great Goodyear Aviation Product that will be first choice for safer aviation the world over.

Goodyear, Aviation Products Division
Akron 16, Ohio or Los Angeles 54, California





Up there with the big names

SKYDROL

nonflammable-type hydraulic fluid

The day is not far distant when, as you see a new Douglas DC-4B carrying a big name in air transportation, you will observe an airplane using Skydrol, Monsanto's nonflammable-type hydraulic fluid. So widely have the superior qualities of Skydrol become recognized that every DC-4B now being constructed for domestic airlines and for many overseas operations will fly from the factory with the extra safety and economy that Skydrol delivers. A majority of DC-4Bs already in operation have been converted to Skydrol or are in the process of being converted. Many of these planes will use Skydrol in the cabin superchargers. Some will employ Skydrol throughout their hydraulic systems.

Skydrol brings greater safety to planes in the air and on the ground. It eliminates the possibility of fires due to hydraulic line failures either while ships are in flight or while being serviced, protecting both personnel and the multimillion-dollar investment. Skydrol's high viscosity brings savings in maintenance costs.

For more information on Skydrol, send for a copy of the booklet, "More Safety in the Air with Monsanto's Skydrol." MONSANTO CHEMICAL COMPANY, Organic Chemical Division, 1300 South Second Street, St. Louis 4, Missouri.

Monsanto Skydrol Offers These Advantages:

SKYDROL is fire resistant—extends the nonflammability requirements of Department of Commerce Specification 115B.

SKYDROL is a proved superior lubricant. In most critical cases, lubricity more than doubles that of other hydraulic fluids.

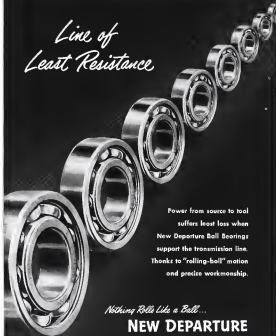
SKYDROL is made of refined operating temperatures and pressures.

SKYDROL is noncorrosive to steel, brass and alloys.

SERVING INDUSTRY • WHICH SERVES MANKIND



Line of Least Resistance



Power from source to tool suffers least loss when New Departure Ball Bearings support the transmission line. Thanks to "rolling-ball" motion and precise workmanship.

Nothing Rolls Like a Ball...

NEW DEPARTURE BALL BEARINGS

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT

already
7,200 lb. thrust



Armstrong-Siddeley

Sapphire
POWER
PERFORMANCE

ARMSTRONG SIDDELEY MOTORS LIMITED, GOSWATLEY, ENGLAND. Members of The Bristol Siddeley Group

NEWS DIGEST

DOMESTIC

Personal Assets Court sentences repayment of 246 personal and executive assets in jewelry. Squeakers of the sort—10 place planes by the 10 companies reporting had a total value of \$1,957,800, and included 155 of four or more places, 95 two place and two single-engine aircraft. Offshore shipments by the same number of companies were 294 valued at \$2,180,000.

New Chief of the Navy Bacter after May 1 will be Rear Admiral Thomas S. Coates, 52, who has been ordered to Washington to succeed the present head of the Bureau, Rear Adm. Alfred M. Price who is going on sea duty. Coates is chief of staff and aide to Adm. William M. Forstner, commander in chief of the Atlantic Fleet. He was deputy and assistant chief in Bacter from 1946 to 1949.

Slick Airways has ordered three more DC 5As. This brings to six the total on order by the San Antonio cargo carrier. Another new Douglas order is for five DC 6Bs for southwestern routes.

Midcontinent Airlines' Covert—Lester crashed on takeoff from Tulsa Municipal Airport Feb. 27, but all aboard escaped serious injury despite the crashing fire that gutted the craft. Early reports indicated that the crash was due to an engine failure.

Supersonic guided missile production plant has been authorized by Congress as a separate new division under contract to Navy's BuAEC. Initial output will be a highly classified anti-aircraft missile, possibly a shipboard-launched type. Plant occupies about 260,000 sq. ft. of floor space and will employ approximately 1500 in the next few months.

Pro American announced two agreements with other airlines. Under one, Eastern will operate New York-Miami FAA planes previously leased; company between its bases at those two points. FAA owns all by the plane under Eastern's name and control as enter EAL service. Through the other, subject to CAB approval, Chicago & Southwestern and FAA will interchange equipment between Chicago, St. Louis, Houston and Mexico City, with FAA operating C-45s Chicago from Houston to Mexico City and FAA plane flying into Chicago with C-45s crew.

Plans to resume the National Air Races elsewhere than Cleveland in 1971.

will have a green light from Air Force and Naval Aviation for service participation today and track tomorrow. Air Races general manager Ben Franklin has approached the Defense Department for revival of the event.

FINANCIAL

Douglas Aircraft Co. net sales for fiscal 1970 ending Nov. 30 were \$127,069,800, with net profit being \$7,124,100, equal to 5.13-6¢ per share on the 600,000 shares outstanding. Dividends fixed as 1970 amounted to 55.3¢ per share, the thirteenth successive year in which the company has paid an increase of 5¢ or more per share. Backing as of Nov. 30 rose to \$616,357,060 from \$275,679,000 the previous year. Furthermore, Douglas noted that the net worth of the firm climbed from \$73,218,000 to \$78,695,000 in the same period.

Continental Airlines Corp. business improvement for the fiscal year ended last Oct. 31 showed consolidated net sales of \$90,404,400, a 31 percent increase over 1969. Net earnings were \$3,411,245, or \$1.09 per common share, the highest in five years. Fiscal 1969 total was \$1,551,205, or 35 cents per share.

Pacific Aerospace Corp. net income was \$315,633, or 35 cents per share, for the year ended Nov. 30, 1970. The same period in 1969 showed a loss of \$24,562. Gross sales of \$13,703,547 were up 41 percent over 1969 and lagged in company's 22 years.

INTERNATIONAL

In southwestern Sweden, completely redesigned operation of the Svenska Flygmotor Co., subsidiary of the SAAB Aircraft Co., is in prospect. Workmen are blasting an old power chamber out of rock 240 ft. below the surface and work has started on a subterranean workshop where Flygmotor will do the entire manufacture of jet engine designed in Sweden for the SAAB jet fighter, to replace the current J 29.

A jet aircraft factory for South Africa is the subject of preliminary negotiations reported by the Cape Town press. The "Star" and representatives of aviation manufacturers have approached the Defense Resources Board and that establishment of such a factory would be welcomed by the Government for defense and industrial reasons.

OMNI is for EVERYBODY!



...and ARC's
VHF EQUIPMENT
brings it to YOU!

Whether you fly private, executive, or transport aircraft, you can enjoy the safety of OMNI with ARC's latest type IIC VHF Navigation Equipment. OMNI takes the work out of navigation—even gives you a reliable radio beacon to follow, so you know your direction from the station. Just know an OMNI and keep the mouth of your ARC instrument on pace. No worry about dead-on static interference.

You get dependable navigation when you need it most! In addition to OMNI navigation the IIC provides for use of the visual aerial range and both the amplitude and phase runway locations. And with an ARC type II VHF 20W Continuous Wave System you get independent, static-free VHF communications. ARC's VHF equipment gives you dependable navigation and communication you can't afford to be without. Write for all the details.

All ARC Airborne equipment is type Certificated by CAA. It is designed for reliability and performance, and is used in pilot briefings for both single and multi-engine planes and made only by authorized service agencies.



AVIATION RADIO CORPORATION
Beverly Hills, California
Authorized Service Agency
Authorized Service Agency Since 1958



On North America's New T-28

Safety Glass

...BY PITTSBURGH



When it comes to industry-wide design competition, North America's new V-10 advanced light aircraft wing safety features for the guarantee of legions of pilots, important among them is better than standard visibility even the most this is accomplished by a first windshield with optional "pan-ception" is the result of these collaborations of Pittsburgh research, laboratory and production specialists with the design engineers who developed this aircraft.



PAINTS - GLASS - CHEMICALS - BRUSHES - PLASTICS

PITTSBURGH PLATE GLASS COMPANY

THE T-28, the newest, most modern and most popular trainer, is designed to help train Air Force pilots for ultra high speed jet aircraft. On this plane—and in practically all of today's large commercial and military aircraft—pilots enjoy greater safety and comfort because of improved safety glasses and glazing techniques developed by Pittsburgh. They provide quicker, more accurate advanced vision for takeoff, maneuvers and landings, better protection from light hazards.

Aircraft engineers have found, in Pittsburgh products, successful solutions to the many new glazing problems encountered in designing advanced models. To meet their needs, special purpose aircraft-type Safety Glasses, transparent plastics, photographic glasses, precision ground and polished glass for gun sight reflectors, bullet and shrapnel resistant and double-glazed Safety Glass, all have been developed by Pittsburgh.

Our product development programs keep us abreast of the civil and military needs of the aviation industry. Our world-wide glass-making experience, our unrivaled research and production facilities are at the disposal of all aircraft manufacturers, large and small. When you are concerned with problems that concern airplane glass and glazing, bring them to Pittsburgh for successful solution. Pittsburgh Plate Glass Company, 1000 1 Grant Building, Pittsburgh 10, Pa.

WHO'S WHERE

In the Front Office

H. V. Lendberg has been appointed a vice president of Kaiser-Fraser and will represent the firm at Fairchild EDA on the C-119 production program. Lendberg joined K-F in 1951, coming from North Aircraft where he was in sales and engineering. He has served in design, sales and management capacities in the various Kaiser companies.

Charles S. Jackson has been named a vice president of Eastman-Kodak New Corp., Conn. He has been a director of the firm for the past five years.

Edwin G. Wilson has been named vice president/general manager at Kaiser Air Craft. He was previously acting general manager. Wilson's connection to aviation goes back to 1928 when he was with Cessna Wright and during World War II he served in the aircraft division of the War Production Board. Prior to joining Kaiser he was again with C-W as European sales manager.

A. G. Finkelstein has been named vice president of Lord Mfg. Co., Pa., since a merger open since 1948 when Thomas Lord was elected to the presidency. Finkelstein has been associated with the firm for 20 yr., a graduate of the Tusculum Bank & Trust Co.

W. G. McDowell has been made president of Caldwell Aircraft Repair Service and Thomas F. Lewis was named vice president. McDowell was chief aviation engineer for Union Oil Co. of California during World War II, Lewis began as aviator in 1932 with Western Air Lines. He was vice manager of Pacific Airlines Corp.'s Burbank division prior to his present association.

Changes

Bernard Dwyer has been appointed director of the Republic Aviation General Motors aviation program which will develop F-104 modifications for both firms. Dwyer was for four years superintendent at Republic. Other changes made for the Long Island plant under include: Ray S. Smith, co-engineer of engineering; C. I. Rosen, co-engineer production control; Irving Lewis, coordinator of inspection; Phil Decker, coordinator of tooling.

Calvin H. Jones has been named manager of public relations for Henry Gyro Corp. of Cleveland. Guy has joined Bell Aircraft as special assistant in charge of temporary problems. Ray D. Dole has been made chief design engineer of Pacific Aircraft's manufacturing division. R. M. Frazier has been appointed chief project engineer, L. W. Ruffalo is now chief research engineer and R. C. Guy has been made project engineer.

INDUSTRY OBSERVER

►Eight AFI evolution teams are testing Grumman SA-16, F4H, F4U, Chase XC-123 and Douglas YF-17 aircraft to meet a Strategic Air Command requirement for long range recon missions. Requirement is for a plane with a 5000-mph range, ability to get in over a 30-ft obstacle, and land on a marginal strip, landing within 1000 ft. Plane, with a 20-mph cruise capability, must be able to get off the strip, clearing a 95-ft obstacle, using 400, within 10 ft.

►First batch of Republic F-84E Thunderjets has been received by French Air Force under terms of Mutual Defense Assistance Program of the North Atlantic Treaty. French sources in Washington state that their country will have six squadrons of F-84 fighters in operation by the end of calendar year 1955.

►Pratt & Whitney publicly release of new Chance-Vought F7D-3 Cougar contract by the company has caused some red doors at Navy Department. Funds for the plane are programmed out of the 1st Supplemental budget yet to be presented to Congress.

►Industry circles are buzzing about the sudden way Air Force posted requirements for the 25,000-lb payload medium transport (see Transport Section). USAF, after chatting around suddenly has come to a view, last month put out bids demanding that detailed engineering studies of the proposed plane be based on Air Force specs by May 16, for evaluation. Some industry sources think Air Force has already made up its mind as to the "winner."

►Four of USAF's 56th Fighter Wing F-84 Thunderjets are being shown in a series of demonstrations to the Belgian air staff at Melsbroek Airport in Belgium. The country is scheduled to get a similar quantity of F-84 fighters under terms of MEAP. Meanwhile Belgian pilots are undergoing jet flight training at USAF bases in the United States.

►American Helicopter Co.'s lease of part of Palco Field, near Mesa, Ariz., (Aviation Week Feb. 26, p. 26), is for the purpose of continuing research and development work on the palmer 2647 which has been underway for the last three years. Company will have 300 workers at the field.

►Timing of first flight of the Boeing XB-52 right jet bomber, proposed as a successor to the B-45, depends largely on the speed at which development is pushed on the test B-45. Whether 147, most low thrust engine, which will power the XB-52. While the 147 has already shown much promise in its first ground runs, the first one has not to fly. It is due to get up soon suspended from the bomb bay of a B-50.

►Air Force has scheduled delivery of service test production quantity production of Chase C-122C light transport now awaiting completion at the company's Division, N. J., plant to Scott AFB, Illinois. Three planes will be used to equip the first assault group combat squadron at that base. Squadron is scheduled to visit the aerial tower for progressional assault plane troop carrier groups.

►Boeing B-47 and Martin XB-51 airplanes are now using anti-skid devices on their bi-cyclical landing gear, and Wright-Patterson AFB officials say the devices will be used on inter-continental planes. One of the devices, the Discoidal manufactured by Worthington, is based on the relative speed of the wheel to an uneven wheel. The other, the Hord developed by Boeing, uses a hydraulic shock detector and a solenoid valve. But in both cases a valve is used to shut off pressure on the brake drum at the point where a skid begins, so neither how much pressure is applied on the brake pedal. The Boeing device is now being manufactured by Electro-Tech, Inc., Los Angeles, under the name of Hydro-Air. Reduced tire wear and reduced landing roll, regardless of pilot efficiency, are results of both systems.

"Emergency" Program: When?

Tireless for the "national emergency" build-up of defense has been slowed down again. The plan now is that the budget request to that supplemented at the rest of this year and 1952 fiscal year funds in "one package") to implement it will reach Congress (the beginning of April). That's the word the President has given to House Appropriations Committee Chairman Cleggman. Cleggman's plan was to have the "package" arrive promptly after Congress convened.

Meanwhile, the country is still lurching along on the modest defense build-up program, down as before the Russian-supported Chinese Communist mainlanders in Korea provided the dedication to an emergency.

Cannon announced "that the laboratory work is progressing in Korea and that the services are emphasizing, studying, evaluating, to meet more than meet when they move into main commitment. They don't want to buy a lot of wrong equipment. Then the individual line is being expanded."

But generals and admirals believe the top personnel are getting restless. They're responsible for building armies. They're not getting the wherewithal to do it. The funds they need for equipment and personnel are tied up in top policy level talk.

An Defense Counselor's Whitehead credited to action. "Several months ago, I thought we were going to come along pretty fast. But it seems to have slowed down. I certainly would like to have the assets at carrying out our mission with the least delay."

250-Group USAF?

What might have been the great debate over U. S. ground troops for Europe has faded for want of a real question: USAF declined to supply it.

That work, a long-ignored business before Senate Foreign Relations Committee developed that all the military services really were in basic agreement.

Building strategy. Build up at a defense level army in Europe strong enough for a building action which strategic air alone the industrial heart out of Russia is virtually a reality "now." This would mean about 60 divisions and 60 supporting tactical air groups. There are now less than 20 divisions in Western Europe, including the U. S. divisions. U. S. contribution at four more divisions, plus tactical air support of perhaps four or five groups, open the European frontiers to any the services consider it well worth while.

It would be fatal to Sen. Wright's House USAF's former Chief of Staff, Gen. Carl Spaatz, declared. Force generals who appeared, from Chief of Staff Gen. H. H. Arnold, down the line, agreed. Even Maj. Alexander de S. Strong, strong advocate of interceptors, would be looking for the British idea down as unrealistic as a line for an air war against Russia.

But no land war. Russia "has no thought of no offensive land operation against Russia." That would take a minimum of 300 divisions reported by 330 tactical air groups, Secretary of Defense Gen. George Marshall estimated. There were only 55 divisions in Europe at the end of World War II. The current USAF's Whitehead says to such strategy as the levels of Army's Chief of Staff Gen. Landon Collins that attack-headed guided

missiles and armor artillery shells might make a feasible for a comparatively small Western ground force to win out over some 230 Russian divisions.

The debate will continue on the political level—in the President's as Congress' prerogative to give the green light on the four divisions for Europe? But, actually, it's settled.

Not much is a key victory for USAF. The cautious language of USAF's general that the 45 groups, now planned by the end of 1952, isn't enough, indicated congressional support for more support—and later USAF (to) settle into a position where it's going to be pushed by Congress into a larger buildup.

"As a minimum, the Air Force should have in any group in it had during World War II," retired Gen. Spaatz pointed out. "That would be 150 groups. Congress probably won't push the goal that high. But someone as already demanding that Defense Department let the Air Force tell them what air power the U. S. really ought to have in any fight for it. Gen. Whitehead isn't willing the scenario—yet. He won't until and if Secretary Marshall assents to the demands and does it."

USAF Generals Say

In testimony before the Senate Foreign Relations Committee, USAF leaders reported:

• Gen. H. H. Arnold, USAF's President. He said the program for an all-out buildup of Navy and Air Force. I am very much as agreement with that position in guiding us forward in the Air Force.

• Lt. Gen. Robert Whitehead, Air Defense commander. "Our air defense is not now adequate." The emphasis on not coming in but as I thought they would—and I can't go into this question in public. The program's build-up will give us a minimum no defense. Four primary things go to a large-scale thinking here for a defense effort."

• Lt. Gen. Harold E. Gorge, (now vice president of Hughes Aircraft Co.) pointing, Whitehead's was for such a "minimum" defense and Whitehead's position that full proof defense is impossible, making the best defense. "The science and the capabilities of the American people can create an air defense that can parry the very best out of Russia if the attempt to attack. We must have it—and be prepared to serve it over a cold war of 20 or 30 years."

Navy, Army Say

• Adm. Forrest Sherman. "It's a fact of life that a war to prevent the overrunning of Europe will have to be fought on the land. And we can't afford to have a hostile power wave that much closer. It would give Russia control to the Atlantic for such attacks on itself as we had in 1918."

• Gen. Ernest Collins, on Sen. Kenneth Wherry's in formation. "You a top military source" that studies show that at least 75 percent of the destruction on the enemy's warships, tanks and other equipment in Korea was accomplished by USAF and Navy air. "Absolutely that. The best estimate is that 53 percent will be ground forces, 33 percent by air forces."



SUBCONTRACTORS tell what they can do, contractors show what they need.

New Way to Get Defense Orders

Prospective subcontractors get chance at area exhibits sponsored by AMC to inspect items they might make.

A new way of solving a production problem looming in the expanding aviation industry has been given a limited test run in New York for the Air Materiel Command, with results indicating it may soon be standing guard elsewhere in the country.

The problem being up perspective subcontractors and suppliers, who, for some manufacturers whose backlog now have, have about 54 billion.

The method an exhibit by prospective subcontractors and suppliers, who, for some manufacturers whose backlog now have, have about 54 billion.

Small Reorganization. The first show of this kind was running up in New York last week at the office of USAF's Field Force Procurement Office (now to become the AF Eastern Procurement District). Originally, the show, was scheduled for five days, it drew nearly 4000 firms seeking subcontractors, and was held over for another week at a cost.

Representatives of AMC's districts in Boston, Chicago and Fort Worth studied the New York operation and it is expected these offices and the others at Detroit, Dayton and Los Angeles shortly will plan for their own shows.

Small Reorganization. AMC's interest in an idea that started out as purely a local and often undertaken a problem that in

nation organizations were contacted by both. In the last three days 1200 small business people came in to see what they could handle. So Gen. Thomas ordered that the Office get a reading on the other price contractors in its jurisdiction.

All personnel went to work selecting contractors, official state planning and development bodies, and members of Congress in right Eastern states. The show, which began at 10 A. M., was originally slated to exhibit the products of 27 big firms which had over 100 contracts totaling more than \$250 million.

The average annual order—\$80 million from government the first day over 1500 during a day in which the weather was very bad, and at the week's end nearly 4000 small companies had sent representatives.

Exhibitors. Hagge—The first round, midday—Soviet-American joint—was the two-story floor AMC office at 67 Broad Street, and moved along the exhibit tables, inspecting copiers, notes, gages, electronic bridge, big and small items, drawings, printing over 100 gages, through questions about later sizes and production runs at the scheduled hand-picked, but has representatives of the price contractors only with interest.

In fact, the contractors selected took look of questionnaire group data on the production capabilities of the small firms to be considered for letting of subcontracts.

Contractors, representatives were unanimous in their enthusiasm over the presentation. Besides, many people told of the difficulty they had had previously in obtaining lists of subcontracting a different order. In the first week of the show they had a list of 45 fully and eight gages (gages).

That had a human operation in solving difficult working at face value they had been trying to solve for them out. Into the exhibit walked a representative of a fishing gear firm on giving 200-1000 women, well-served and middle-aged, through experience at visiting four steel mills. The problem was discussed and the job was free to take the job.

Stories like those were common of over the floor.

The system also opened well for smaller subcontractors who were able to make contact with large firms in located at their personal service.

As a result, Gen. Thomas ordered that the display run another week and several subcontractors were invited for original 27 exhibitors.

Our Expanding Industry...

Alfa Romeo division of General Motors secured a large production contract for newly designed JT-15-AD turboprop engine used in the 10,000-lb. short haul. Both Alfa Romeo and GM's Chevrolet division will work on the order, due scheduled in one of the largest single orders ever placed with GM.

Lock Aviation Inc. has received a contract for F-100C flight simulator, including its building to approximately 325,000 sq. ft. The company has orders for simulators of the B-70 jet bomber and the F-10D Navy jet fighter.

Whitcomb Corp., St. Joseph, Mo., is now inventory equipment manufacturers, has received a sub-contract from Kaiser-Fraser Corp. for wing section of the C-119C to be built by B-2 at Willow Run.

Boring Airplane Co. is planning construction of a 15-million-hanger across the street from its Seattle plant. Company has officially requested a 75-year lease on the site.

from the county board of common council.

Boeing Aircraft Corp. has taken production of work at the new Clyde Aircraft Corp. plant at Ft. Worth for assembly of jet engine nacelles of B-45 and B-47 bombers. Then, plus 10,000 sq. ft. in aircraft nearby site of B-45 will appear, mostly 20,000 sq. ft. at the Ft. Worth area.

Singer Engineering Co., St. Paul, Minn., has been awarded a \$4 million contract by North American Aviation Inc. for production of external fuel tanks designed by NAA. Singer's tanks will be used on the A-1 and C-1 models of the F-86 Sabre.

Lawrence Airplane Corp. has received new orders from Convair for "substantial quantities" of two new engine turret assemblies for the B-56. Lawrence already in production 26 types of B-56 turbine blades and is looking to turn out 35 blades.

similarity of the outside, and the engine's location. Thus the manufacturer will determine the outside dimensions only to produce an exterior nose.

Previously there was no control source of such data. Each aircraft manufacturer was required to design his own data, but has particular needs, although duplicate data, owned by other aircraft manufacturers, might have been already in existence.

Where to buy it—The catalog will be available for purchase by industry from the Superintendent of Documents, Washington, D. C., from the Commanding General, Air Materiel Command, Dayton, Ohio, or from the Commander, U. S. Naval Air Development Center, Johnsville, Pa. about Nov. 1, 1951.

Extruded Prop Blade In Production

Patentees know how has pulled the extruded steel propeller blade from a completely new experimental period to a rapidly expanding pilot production status.

This blade extrusion process first patented by Anthony Wayne, N. J., 1919, evolved into a standing story about 15 months ago by the Propeller Division of Curtis-Wright Corp. at the Air Force Development Center, Dayton, Ohio, under sponsorship of the Manufacturing Methods branch of the Industrial Planning division of the Propeller Laboratories of the Engineering Division, Air Materiel Command. Aid of the metal working industry was also enlisted.

Starting with a 400-lb. steel billet, three extrusion steps plus a single blade in the form of a tapered web, stainless steel tube with an internal flange, and a single blade with an internal flange, and a single blade after the finishing process. (Production details and advantages of the process will appear in a forthcoming issue of *Aircraft World*.)

\$6-Million Projects For Hawaii, Johnston

The U. S. Corps of Engineers has announced it will spend more than \$6 million to improve air bases on Hawaii and on Johnston Island in the Pacific Ocean area.

At Hickam Air Base, outside Honolulu, a 15,000-ft. strip will be built, capable of handling the largest land-based planes the U. S. has, jet or otherwise. The 21-in., 10-ft. wide strip will span two bays and adjacent 10-ft. wide strip at a cost of \$1.5 million.

Army Buying

Funds set aside for purchasing four Chase C-128C transports.

First indication that Air Force and Army have agreed to use present weight limitations now prohibiting Army from buying heavy transport is the new sheet titled "Army funds to buy four Chase C-128C light transports."

Under terms of a procurement agreement of the close of World War II, the Chase C-128C was developed by the Army from direct buying of field wing aircraft weighing more than 2500 lb. and rotary wing aircraft weighing as much as 4000 lb.

Further confirmation of the contract of weight limitations is seen in the report that Army has procured "a large number of Beech model 50 (Twin Bonanza)" for purchase from Ordinance funds out of the Supplemental authorized to be forwarded to Congress shortly.

Army in fiscal 1951 budget to date has been authorized to spend approximately \$48 million for aircraft procurement. Estimated that these funds will be applied by \$130 million more in the proposed 1951 Supplemental bill and basis 1951 budget.

Engineers agree that if weight limitations are eased, Army field aircraft will probably be augmented still further. Army is particularly anxious to expand its helicopter development activities as well as its procurement of service helicopters.

Last year Army spent its plane procurement funds in a ratio of 4 to 1 for helicopters. Army pointed out that this was a dollar figure not a unit plane figure. Out of over 55, and Army, \$40 million for purchase of helicopters and only \$5 bought fixed-wing aircraft.

While Army will maintain its currently planned development and purchase of rotary wing aircraft in fact increase in the ratio will change somewhat in favor of fixed wing equipment at least for the time being.

Here are the general data for the first two planes which Army will buy: a Chase C-128C—powered by two 1405 hp Wright 1820 engines, the C-128C has an empty wt. of 19,000 lb., and a max. wt. of 40,000 lb. range at max. gross weight at optimum cruising speed, sea level, in 1000 mi. at 240 mph, cruising speed, 290 mph.

Flight characteristics in near zero turn and cruise load 31 ft 3 in. 7 ft. 8 in. side and 6 ft. 4 in. high. Cruise floor area 180 sq. ft. and cabin capacity of 2500 sq. ft.

• Beech used 50-Knows conservatively

here in the Twin Bonanza, model 50, powered by two 1405 hp engines developing 240 hp. It was designed for use by the Army for transport of troops, the plane has an empty wt. of 1700 lb. and a max. wt. of 3500 lb. Wing span is 31 ft. 3 in., max. length is 31 ft. 6 in., height is 11 ft. 4 in.

Range at 10,000 ft. and 60 percent power is 1085 mi., average ceiling is 30,000 ft., and cruising speed is 191 mph. at 10,000 ft., and 85 percent of power.

Army will use the plane as a main purpose transport for missions such as reconnaissance, liaison, cargo carrier and executive transport. Designed to operate in all types of weather, the plane can land over a 50 ft. obstacle in 1137 ft. with full flaps and takeoff over a 50 ft. obstacle in 950 ft.

Fairchild Builds New Guided Missile Plant

New addition of the guided missile plant at Fairchild missile production is the new facilities for the Guided Missile Division, Fairchild Engine and Airplane Corp. will be constructed on a 37 acre site at Woodhull, L. I., N. Y.

Construction of the first unit, a 115,000 sq. ft., one-story plant, will begin this month, Fairchild has disclosed. It is scheduled to be in full operation by Sept. 1. Plant cost is estimated at \$1,750,000.

Plant will be the special repository of missiles and missile guidance

systems developed, the new Fairchild plant will include a shielded laboratory designed to be completely free of electronic interference. This and several other areas of the plant will be an underground. Equipment to simulate temperature 65° below zero and the pressure and humidity conditions encountered at very high altitudes, will also be incorporated.

The building is designed for expansion as the need arises for increasing size of the missile square feet of better space. The plant, in addition to including extensive research and development equipment, will be used for final production of the design's current missile and a prototype quantity of new missiles.

Ramspeck Leaving ATA for Government

Air Transport Association's executive vice president, Robert Ramspeck, plans to leave that post to take over as director of the Civil Service Commission.

The President announced him to the \$10,000 yearly government position last week. David, Senate confirmation seemed assured for the new appointment at Ramspeck's salary is a former Democratic representative from Georgia, who served in 1949 in the House.

Adm. Kinsey S. Land had already announced he planned to resign as ATA president at the end of 1951. Land and there were no immediate plans for choosing a successor to Ramspeck.

Dies Pooled

AMC project cataloging extrusion shapes will speed plane production.

A new standardization program for aircraft extrusion dies, announced by the Air Materiel Command's Supply Division will have an industry-wide effect, both on aircraft companies, and on die manufacturers and extrusion production.

The program provides for all aircraft manufacturers who are Air Force contractors, to submit to the Supply Division at Wright Patterson AFB, Dayton, complete lists of aircraft extrusion shapes which they consider active. The division will review these lists to eliminate any dies for which it is decided that no favorable steel trade.

Does in Pool—The participating aircraft manufacturers will relinquish all proprietary or exclusive rights to their extrusion dies and permit the dies to become available to all manufacturers making part of the program and meet any requirements. That will make it possible for any extrusion manufacturer in the pool to use any die in the pool for production of an extrusion to meet a military need for the present aircraft company in the pool.

The extrusion producer will maintain and replace all dies located in even be-

reod steps in long as there is a favorable steel trade agreement.

Upon completion of the screening process, the Supply Division will determine which dies will be available to aircraft manufacturers' pilot machines and extrusion die manufacturers, and complete data.

Cataloging Service—Then the Air Force Cataloging and Classification Section will publish a catalog for use by participants in the agreement, and by government agencies.

The catalog, "Aircraft Extruded Shapes—Aluminum and Magnesium Alloys," will be a revision of Air Force Technical Order No. 10-475-2. The catalog will provide an engineering handbook for design and development work. It will give data relative to availability and interchangeability of the shapes acquired for maintenance and supply, and a consolidated cross-reference of sources for procurement or disposal of extruded shapes. It will include sources of materials and the aircraft industry.

It also will include data regarding properties such as heat loss of different alloys, index of shapes, and current specifications and standards.

For example, an aircraft manufacturer might need a two-inch standard angle shape stock for use in an aircraft. It will consult the catalog, find an extrusion die for the shape he needs, the part number, its diameter, the number of dies available, the die number, the



Orders Grow for Convair 440

Orders for four Convair 440 transports, plus option for two additional 1400 were placed by Hawaiian Airlines last week, boosting Convair's 1948 backlog by 45 orders. The firm will take all at full gross weight on its level four 1020 ft. runway. It will land at its maximum landing weight of 44,500 lb., on a 4219 ft. runway, at sea level.

The expected landing and takeoff requirements at higher gross weights also place the aircraft especially suitable for the Hawaiian routes, Convair said.

FINANCIAL

Capital Air Lines Cuts Its Debt

Carrier converting Series B debentures to common stock; possibility seen of dividends this year.

A major reduction in debt is being achieved by Capital Airlines in calling for redemption all of its 4 percent convertible debentures, series B, due Sept. 1, 1980.

In effect, the company is forcing conversion of the debt. Each debenture is convertible into common stock at the rate of 90 shares for each \$100 debenture. At current market prices for the common, this establishes a value of around \$122.80 for each \$100 principal amount of debentures.

Should holders choose to take the cash redemption payment, they will receive only \$102.50 plus accrued interest. Unless conversions are effected before May 13, 1981, the redemption date, a substantial loss will be sustained by each holder.

Eliminating the Convertible—This conversion of the Series B debentures will considerably dilute the equity. At Dec. 31, 1978, Capital had a total of 327,813 shares of common stock outstanding. Assuming all of the Series B debentures are converted, an additional 245,175 shares of common stock will be created, thus increasing that equity by more than 45 percent to a total of 716,310 shares. A total of 20,466 additional shares will be created when the remaining options, owned by new employees and officers in December 1980, are exercised at \$5.50 per share. This will bring the total issued common outstanding to 796,075 shares.

Of greater significance is the substantial improvement in the Capital financial position achieved by this recent move. At the completion of the conversion of the Series B debentures, the company will have reduced its funded debt to \$3,445,500. The interest on this reduction can be approximated when compared with the debt retired at Dec. 31, 1980. At that time, outstanding debentures amounted to \$9,870,000 plus \$4 million in extended notes payable due the bank. Moreover, on Dec. 31, 1978, net working capital equaled approximately \$385,000.

New Obligations—While previous obligations are being liquidated, new ones are being created to a lesser degree. These are in the form of notes provided to finance the acquisition of the 14 Constellation and related jets. It is

significant that these notes are non-interest-bearing and not payable to Lockheed Aircraft Corp. in installments over a period of from 31 to 35 months from the day of the second delivery following date of delivery. Currently, these notes aggregated \$1,352,980. As of Dec. 31, 1980, payments of \$137,275 had been made, leaving a total of \$1,215,705 of these notes outstanding at that point.

The company severely reduced two additional commitments for delivery in January, 1982 to be paid in the same manner. In effect, this type of financing is in a pay-as-you-go basis and can be converted at will depending on current disposition changes as well as 1.5 times the required monthly payments as the five Constellations. Current and future payments should be effected during 1981 through initial flight operations. Each May 1, the company is required to pay \$200,000 into the sinking fund for the retirement of debentures, if available net income permits. This condition, possibly in the form of 1980 stock. With changes on the upgrade, available net income for 1981 can easily facilitate the making back payments due May 1, 1981, thus anticipating further debt reduction this year.

During 1980, Capital, through its existing flight operations, acquired \$299,000 principal amount of its 14 percent debentures, and \$141,500 of its Series A notes. Both of these cannot be purchased at a discount from par, resulting in a gain of \$123,409 to the company over the year.

Redemption Helped—There is no doubt that the company's financial reorganization, achieved last in 1978, facilitated the rapid debt retirement program once effected. Prior to that time, the debenture provisions surrounding the 10 percent debentures then outstanding in the amount of \$8,820,000, proved to be a definite source of the company's operations. The company was penalized from rising in additional funds to finance badly needed equipment.

The reorganization plan called for the elimination of the old reserve provisions and, as no reduction, the debenture holders were offered an exchange of the new Series A and B debentures in equal amounts. The Series

A carries a fixed 4 percent interest on loans but is nonconvertible. The Series B also carried a 4 percent interest return but was subject to available earnings, the same as the old 5s. But the B series are convertible and attract many investors.

It is significant that while the majority of debenture holders accepted the exchange offer, a substantial number did not. In retrospect, this was not true where the "fixed-rate" did not pay as well as those who were along with the plan. For example, the "fixed-rate" have a market value of around \$550 per debenture compared to an average average of \$1130 for those who made the exchange.

Most Aired Helped, Too—There is no question that Capital was also helped considerably in 1978 by a retroactive sale pay award of around 14 million. This went a long way in making the financial strain at that time. The new pay's provisions paid out in a sliding scale basis and in its percentage value increases, at that time, declined in proportion.

This is clearly evident in the 1979 showing of percentage increase of \$22,179,425 against last revenue of \$3,516,875. During 1980, revenues were \$18,237,207 and \$4,567,193, respectively. If figured in a ten mile rate, Capital was paid an average of \$1.92 per ton mile in 1979 and only \$0.71 in 1980 for carrying the mail. On this basis, the company is moving very rapidly from a "fixed" rate under the group considered in the comparative service data.

During 1980, Capital continued its dispatch of the 14 Constellations. It purchased after the war for use on aircraft than an order, for which orders were subsequently awarded. It achieved about \$1 million in this sale, which is a loss of approximately \$217,000 in the year. But this loss seems to reduce the company's tax liability for the year just finished.

Not everyone for Capital in 1980 was the best in its history. The net income from operations after taxes came to \$1,066,581, and compared with \$534,178 for 1979. In keeping with industry trends, Capital's earnings for 1981 are currently running substantially ahead of 1980.

No dividends now be paid on the common stock until the deficit in the current period amount is made. This deficit was around \$415,591 at the 1980 year end, representing a substantial loss. However, if the company continues at their present rate, Capital may no longer have a residual loss to dividend payments on its common stock by the time 1981 will have come to a close.

—Sally Altshuler

PRODUCTION

AMC Expediter

New Industrial Planning Division will help solve manufacturer problems.

Second phase of the overall Air Force industrial mobilization program went into action recently when Air Marshal Command's Industrial Planning Division at Wright-Patterson Air Force Base and the Production Resources Division, under the same chief, Brig. Gen. Alford H. Johnson.

Gen. Johnson and the new division's assignment would be to help manufacturers in the Air Force program fill their manpower requirements, both man and materials, and set up a quick trouble-shooting and bottle-necking for any contractors who reach saturation.

Initial industrial planning will be continued by a separate section within the new division. But the broad outlines of the industrial plan for the present emergency are new, and the industrial mobilization is already proceeding along these lines. So now Air Force plans are as their present work the act of spring-loading the industrial mobilization program.

While some difficulties resulting from shortages of manpower, materials, production equipment and facilities are inevitable, Gen. Johnson's new division is working to hold this to a minimum, well below the high production levels of each World War II day.

Vietnam Newcomer—He is leading his new division on a mission of veterans in industrial planning and specialists from the old divisions and upon AMC studies of production procedures in new, industrial and military. The Production Resources Division has been part of an overall plan for the last few years. U.S. task groups, such as the National Total Readiness Army, Alameda Air Force Base and the Air Force's Strategic Engineers have worked with the Air Force in setting up plans for the new division and have offered to assist in its activities, now that it is established.

Gen. Johnson said "Because of the extensive and realistic planning is all concerned, the Air Force has a good start at taking production problems. For example, we already have a number of emergency specialists to help solve the difficulties of many types. Also we have a group of materials specialists to assist on contractors in locating sources of scarce metals and materials."

"One accomplishment already paying off hand-on is the stockpile of spare machine tools put in storage by the industrial planning division at the close of World War II. These tools are now available. They are being supported by Air Force contractors in their needs now."

Another major activity of the new PRD will be to help manufacturers find suitable production facilities. It is a contract with additional plant capacity, the division will assist in locating suitable facilities equipped in non-military production, and in contract them to the size and type of job.



FLYING SECTION in which 788-16 extension is being put together.



14F100 in wing spar. Back is shown followed after first flying run and



FINISHED SPAR with 51 in. taper section from further forging and machining

Forge-Taper Forms Wing Spar

An aluminum alloy wing spar has been experimentally fabricated for a McDonnell Aircraft Corp. fighter plane by a new forge-tapering process.

Known as the 100-100, length is from approximately 114 in. down to 30 in. Span weight is 117 lb.

Wider to the fabrication came from McDonnell's production manager, John J. Butler. Collaboration between McDonnell and Aluminum Co. of America gave the forged spar.

Benefits—Use of this new approach is to eliminate the expensive complexity required in the usual method of using two T-sections and accessories usually with members to achieve span taper.

The large tapered spar is reported to

be to the south of the Air Force PRD and is available to all prime contractors and subcontractors engaged in Air Force work. Designations will be at Wright-Patterson AFB.

The new division is seen in a parallel organization to the old Production Resources Division at AAF's National Command in Wright-Patterson. It is at the head of the division that Lt. Gen. K. B. Wolfe, now Deputy USAF Chief of Staff for Material, had demonstrated his ability to short-cut material and type in expediting war production. His work there led to a similar assignment to head the successful "Cradle" program to expedite production of the Boeing B-29 Superfortress, which is credited with critically shortening the size and type of job.



FLYING SECTION in which 788-16 extension is being put together.



14F100 in wing spar. Back is shown followed after first flying run and



FINISHED SPAR with 51 in. taper section from further forging and machining

Forge-Taper Forms Wing Spar

An aluminum alloy wing spar has been experimentally fabricated for a McDonnell Aircraft Corp. fighter plane by a new forge-tapering process.

Known as the 100-100, length is from approximately 114 in. down to 30 in. Span weight is 117 lb.

Wider to the fabrication came from McDonnell's production manager, John J. Butler. Collaboration between McDonnell and Aluminum Co. of America gave the forged spar.

Benefits—Use of this new approach is to eliminate the expensive complexity required in the usual method of using two T-sections and accessories usually with members to achieve span taper.

The large tapered spar is reported to

Negotiated Contracts

Los Angeles contracts began the season to break up at a rapid rate. Negotiated contracts totaling nearly \$70 million were announced by 1984 for the week ended February 9.

Several of the contracts were cashed-out dollar offers. Rockwell International Co., Van Nuys, Calif., got over \$16 million as contractors for target aircraft and accessories. Douglas Aircraft, Santa Monica, got \$12 million for prototype aircraft. North American Aviation, Los Angeles, was awarded over \$6.8 million for new reference spare parts and assemblies for aircraft. Boeing, Wichita, got over \$5 million for reference tool links.

A partial list follows:

Airquip Corp., Jackson, Mich., aircraft tool, CA 198, \$397,345.

Aero Supply Mfg. Co., San Francisco, Calif., CA 984, \$51,827.

Al Associates, Inc., Teterboro, N.J., commercial hardware, CA 22, \$93,786, net cash; Jan. 20, CA 984, \$35,000.

Aircraft Hardware Mfg. Co., Inc., Boston, N.Y., aircraft floor reference tool links, CA 214, \$182,541; aircraft tool, CA 214, \$34,491.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Endevco Engineering Magnetics Co., Inc., Los Angeles, CA, CA 188, \$51,215.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Armstrong Co., Lehigh, Pa., gun barrel, cold, crane-hoist lift, CA 218, \$57,594.

Clamp, rapid pressure type, CA 174, \$400,000.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Corbin Ford Corp., Louisville, Ky., re-actors, CA 164, \$39,407.

Need small lots of seamless tubing right away?

These two wear-resistant TIMKEN® steels will do 90% of your hollow parts jobs

WHEN you've a rush job on your hands, that's two good reasons to turn to Timken. Timken's 52100 and "Nickel-Moly" steels can be shipped to you in as little as 24 hours. And "Nickel-Moly" comes in 52 sizes, from 1" to 10 1/2" O.D. And "52100" comes in 101 sizes, from 1/8" to 16 1/2" O.D.

No matter which of these two Timken steels you order, you can be sure of uniform, high quality in every tube—and in every shipment. That's because every pipe of material is rigidly and carefully controlled—dimensioned, machined to final length. We're fast stock items with the latest information on available sizes, grades and finishes. The Timken Roller Bearing Company, Steel and Tube Division, Canton, O. Ohio. Cable address: "TIMBOSCOP".



Letters and Wires
Now Pouring in—

"MORE BRAD FOOTE GEARS —PLEASE RUSH!"

...so American Gear

SWINGS INTO ACTION

Demand for Brad Foote Gears has been heavy—continuous—growing bigger daily...

So we're converting the complete facilities of American Gear & Manufacturing Company, now a fully-owned subsidiary of BRAD FOOTE GEAR WORKS, INC., to the production of gears also. These gears will be used in every way to BRAD FOOTE in engineering, design and quality...and fully up to BRAD FOOTE's known standards of competition and delivery.

AMERICAN GEAR & MANUFACTURING COMPANY is a smart, flexible, fast-moving, young concern located in Lemont, Illinois. It comprises 56,000 square feet of space. It owns of land, and is served by spurs of two railroads and by the Drainage Canal.

AMERICAN will help meet gear production short-age. It will pay you to investigate.

American Gear & Manufacturing Company
LEMONT, ILLINOIS

a Subsidiary of

BRAD FOOTE GEAR WORKS, Inc.
1309 SOUTH CICERO AVENUE, CICERO 90, ILLINOIS

EQUIPMENT



MAINTENANCE TIME: coated blade used at NAL's Miami airport here to help ease load trends.

Spark Advance Saves At National

Carrier says DC-4 fuel consumption and costs drop; reports passengers are pleased with cabin noise.

By George L. Christian

Miami—National Airlines, only DC-4 operator to use automatic spark advance on the R-2000 engine, reports that the system saves fuel, is easy on exhaust valves and functions very satisfactorily. Refused Service, NAL, spent hours, engineers, field mechanics. When that has company was realizing these benefits from the automatic device.

Service tests began in the engine in 1947 were concluded in March of 1949. Results were so gratifying that it was decided to make a field-wide installation on all seven DC-4s.

NAL engineers said that the spark advance, used on R-2000 D1 engines, covers between 440-750 hp. Spark advance in the spark plug at 57 deg. before top dead center instead of 25 deg. and fuel/air ratio is reduced from .063 to .057.

FAW believes it desirable to use spark advance on the R-2000 and R-1550 engines. The engines are equipped by its use.

Some interesting information read at NAL's Miami headquarters: "Maintenance time control block. Referred to the 'Propeller Base', that NAL incursion (see photo) consists of a series of checks, one for each phase in the company's fleet. Shaking down on each check one a number of small blocks, one to each operation to be performed on the unit.

The bottom block, as one checks indicates the next operation that is

Supervisors familiar with inherent advantages of the system. On getting NAL, he supervised its management that time would be worth while.

When spark lines stick, he catches on a particular plane, a block showing the used time is marked on that ship's chart and when the governor reaches full overhead, the block will automatically appear at the bottom, telling the supervisor that its removal is due. NAL indicated that other airlines had suspected the board with a view to stopping its passage to their use.

The block handles with equal ease items which must be removed or overhauled at specific date, instead of time, such as life tests.

•Cabin noise. National is one of the airlines successfully to provide its passengers with music.

When you board an NAL DC-6, soft music emanates from four ceiling loud speakers. Located in a type room located in the vestibule, by the main cabin door. Music provides the tape.

Passenger complaint has been so enthusiastic that NAL is providing with a more elaborate installation which will include the addition of 20 extra speakers, one for each pair of seats. These will be equipped with individual volume controls.

•Omnis sets. NAL is half way through installing the Collins Model 51A22 semi-directional audio receiver in its DC-6s. Program calls for complete installation in 5 DC-6s and 7 DC-4s by next winter at a total cost of approximately \$7500 per plane.

Other activities at National include: •Installation of dual oil valve on propeller shafted driving line on DC-4s. One dual propeller supplies fuel to

that particular airplane. The total plane has where the work is done is also affected. When plane time equals time indicated on the block, the operation is performed. Thus the need indicates of that job written on the block which is then removed from the bottom of the chart and inserted higher up in the line according to the new time indicated on its face.

A roll of 1/2-inch tape handle each chart keeps tabs of total aircraft time and lets time remaining on all items having 150 hr. or less before requiring overhaul.

NAL says the potential board has definite advantages over previously used systems. It enables personnel to keep tight control of combined time parts. Example: a propeller governor is removed at 75 hr. but when checked in the shop it found to be in perfect condition. Instead of overhauling an unnecessary overhaul, it is returned to stock with a record that it has operated 75 hr.

When spark lines stick, he catches on a particular plane, a block showing the used time is marked on that ship's chart and when the governor reaches full overhead, the block will automatically appear at the bottom, telling the supervisor that its removal is due. NAL indicated that other airlines had suspected the board with a view to stopping its passage to their use.

The block handles with equal ease items which must be removed or overhauled at specific date, instead of time, such as life tests.

•Cabin noise. National is one of the airlines successfully to provide its passengers with music.

When you board an NAL DC-6, soft music emanates from four ceiling loud speakers. Located in a type room located in the vestibule, by the main cabin door. Music provides the tape.

Passenger complaint has been so enthusiastic that NAL is providing with a more elaborate installation which will include the addition of 20 extra speakers, one for each pair of seats. These will be equipped with individual volume controls.

•Omnis sets. NAL is half way through installing the Collins Model 51A22 semi-directional audio receiver in its DC-6s. Program calls for complete installation in 5 DC-6s and 7 DC-4s by next winter at a total cost of approximately \$7500 per plane.

Other activities at National include: •Installation of dual oil valve on propeller shafted driving line on DC-4s. One dual propeller supplies fuel to

U.S.I. SOUND POWERED assures dependable communication

**SAVE TIME . . .
DON'T WALK . . .
TALK . . .**

For those . . . on battery and for
battery . . . how much you get the
most kind of voice communication—
not just voice communication all the
time "radio" means . . . also the range
factor up to 100 miles. Giving the
operator freedom of movement
without restriction of range
quality in each instance.

**INCREASE YOUR EFFICIENCY . . . CUT COSTS
WITH U.S.I. C**

**UNITED STATES INSTRUMENT CORPORATION
SUMMIT—NEW JERSEY**



FOR YOUR "AN" OR STANDARD STAINLESS STEEL FASTENERS . . . ITS ADVANTAGE.

ADVANTAGE
Special-
ize in Stainless
Products
Product Catalogue

For quality and delivery

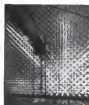
Advanced Stainless Fasteners meet the rigid requirements
of the American Industry. All types and sizes, "AN"
or STANDARD, in stock. Stainless Fasteners
Pound Forwards and Specials available too. Complete
fastener order one roof service prompt delivery.



**MANUFACTURERS SINCE 1929
ALLMETAL
SCREW PRODUCTS COMPANY, INC.
33 GREENE STREET NEW YORK 13, N. Y.**



CONSTRUCTION detail of PEBBLE
tread showing wavy PEBBLE formation



STRIPING pattern of wavy ridges
retains in Center Propeller test cell.

direction. Each provides 17 sq. ft. of
pulsated, constant area and weight
20 lb. Aluminum core and the ends and
are provided with shaft for support use.
The PL-ONE units should be kept
independently with no contact between
them.

Units are flat in addition to their
round shoring efficiency, the units
are unobstructed by the high wheel
velocities to which they are subjected
and are highly corrosion resistant.

Some PL-ONE PL-ONE units have
been delivered to such units as Grumman
Propeller Division, Grumman-Wing
Corp., USAF, Wright Patterson AFB,
U. S. Naval Air Station, Naval Air
Station, and Grumman Air Force
base at Grumman and El Centro.

The 1600 units installed in the
test cell of Grumman Propeller's test cell
in California, N. J. (see note, page
51, 1961) are in, at Grumman Air
Station & Co. provides a variety of
equipment for testing propellers and
jet engines.

NEW AVIATION PRODUCTS



not dolly designed to permit our operator
to change the tire at service the
wheel for better service. The tire
also can be used with tire and
other equipment. It is similar in ap-
pearance to a tire changer developed
by Eastern Air Lines for its own use.

Small Aero Cable

General Electric Co. has developed
what it terms "a greatly improved flexi-
cable for lighting and power in aircraft."

Called Fiberglass cable wire S-7750,
the cable has a vinyl compound
insulation covered with a protective
rubber sheath. It is designed for opera-
tion at 500 and conforms to speci-
fications ANJ-C-44a.

The wire is lightweight, flexible and
aluminum resistant. It also is excep-
tionally resistant to flame, oxidation, gas-
oline, oil and grease, according to the
firm. Address: Construction Materials
dept., General Electric Co., Bridgeport
2, Conn.

Tableway Lubricant

A high performance tableway lubricant
for machine tools, "Table K-33," for
use with lathe, planer, grinder and
similar equipment has been developed
by East Standard Oil Co., New York.

The lubricant meets the requirements
of the Grumman Milling Machine Co.
(Grumman GMM Co. F-47) for
lubricant of this type and passes GMM's
"dry-test" test. To pass this test, a
tableway lubricant must have a coefficient
of static friction lower than its
coefficient of kinetic (or sliding) friction.

In effect, less force is required
to start one surface moving in relation
to the other than is necessary to main-
tain movement between the two sur-
faces. As East Standard explains, "this
is a unique quality, since most lubri-
cants are most effective under the op-
posite, or dynamic conditions."

In many operations the tool head
or table track tends to speed up slowly
to be almost imperceptible. It is im-
possible with ordinary lubricants for a
full fluid film to build up between the
two working surfaces unless these con-
ditions, says East. "The table circuit
and lubricant combination will prevent
work to avoid tolerance."

Fiber K-33 is designed to prevent
this, maintaining a full fluid film at all
times. It also is superior to straight
oil-based oils in that it does not oxidize
and form sludge. The product is a
slightly thick, non-corrosive lubricant
with high resistance to washing loss.

metal surfaces and solid resins. For
more characteristics. Address: 15 W.
51 St., New York 19.

SAFE FLIGHT DECALS			
TYPE	DESCRIPTION	SIZE	PRICE
1	Safe Flight Decal	4" x 6"	\$1.00
2	Safe Flight Decal	4" x 6"	\$1.00
3	Safe Flight Decal	4" x 6"	\$1.00
4	Safe Flight Decal	4" x 6"	\$1.00
5	Safe Flight Decal	4" x 6"	\$1.00
6	Safe Flight Decal	4" x 6"	\$1.00
7	Safe Flight Decal	4" x 6"	\$1.00
8	Safe Flight Decal	4" x 6"	\$1.00
9	Safe Flight Decal	4" x 6"	\$1.00
10	Safe Flight Decal	4" x 6"	\$1.00

Safe Flight Decals

Information on existing airplanes,
VFR minimums and light gun signals
is arranged for quick reference on new
flight decal developed by W. S.
Tolson, Port Smith Airways, Port Smith,
N.Y.

These small decals easily can be ap-
plied to windshields or instrument
panels after writing. They pack in a
neatly arranged instant match informa-
tion control to the safe operation of
aircraft, and serve as helpful reminders
to pilots, particularly on cross country
flights. Details and sets of these.

ALSO ON THE MARKET

Efficient pumps for drawing light liquids
(from 15 to 35 psi) draw from pump type
vacuum tube that fits snugly into V-
and 3-in. openings. Made by General
Screwfast Equipment Co., 1015 Parkside
Blvd., Philadelphia.

Full flowmeter for measuring and
jet engine aircraft have been adapted
for use in U.S. planes and are offered
in complete range by George Kent, Ltd.,
London, England.

Portable light, designed for defense
plant use in emergencies has two fil-
aments, one providing 60 hr. continuous
service at normal power, the other
permitting unit to be used in high power
mode for 20 hr. without battery
charge. Made by Carpenter Mfg. Co.,
Spartanburg, S.C.

Improved L-40000 hand driven for
use in factories incorporates auto-inter-
locking mechanism and built-in to en-
hance accuracy and stabilize work
loading or "loading" effect. Made by
West Manufacturing Co., Long Island City,
N. Y.

Lathe service rest, for dispensing lubri-
cants to bearings in industrial machin-
ery, is self-contained, two-wheel guide
type that can be moved rapidly along
plant rails and between specially
production machines. Made by Gary
Co., Inc., Green Bay, Minneapolis 13.



Royal Navy Drafts the Fairey 17

Quantity production of new turbopropelled subhunter is ordered after extensive competitive trials.

(McGraw-Hill World News)

London—The Fairey 17, Britain's turboprop subhunter has been selected in quantity from Fairey Aviation Co. Ltd., Ely, Cambridgeshire.

The British Admiralty, after sponsoring extensive competitive trials of three similar types (Fairey 17, Blackburn Y.B.1 and Y.A.5), ordered the Fairey design as their choice. Shortly after the end of the competition, the Ministry of Supply placed the production order.

Outstanding feature of the subhunter (built from its horizontal section) is its powered, a Double Marlin turbo-prop engine.

Production of the plane should be greatly speeded by Fairey's machine tooling system (Aviation Week, Jan. 30, 1956, p. 17) in which the outside skin of an airframe component is fastened in the jig, and rim and other internal members are then built into the skin. The prototype 17 was built this way.

• **Get to It—A study of the external and visible characteristics of the 17 show that it has been tailored for sub-hunting.**

The three-man crew (two are provided for in the prototype) sit above the Double Marlin. The pilot has excellent downward and forward visibility.

Main rotor device are housed in a retractable "dashpot" radome housed away on the belly. Attack weapons—including a new short range depth bomb—can be stored in the

large bomb bay. Sonobuoys and other equipment will be carried on the under side of the wing.

The plane has been designed to keep within a length limit that will permit it to be stored on the longer decks of some of the smaller carriers. Height with wings folded is 25 ft. 9 in.

Wings are double-bellied which requires the flaps to be built in two sections, separate, and are folded and spread independently in 22 sec.

Fairey officials claim there is no difficulty in loading the bomb bay, although the ground clearance there is very small.

In common with other Fleet types, the 17 is fully equipped for deck operations; it has a tailhook arresting hook and catapult fitting.

• **Engine Choice—Fairey designers saw**

two major reasons for selecting the Double Marlin turboprop engine.

• The Admiralty wants to switch all its carrier aircraft to gas turbine engines to avoid carrying gasoline on its carriers.

• Overall fuel consumption characteristics of the new turboprop could be better than those of the single engine.

Power of each unit of the Double Marlin is enough to cruise the 17, for combat, both engines are taxed. For this, if either half of the engine should fail, or be knocked out in combat, the other half would have enough power reserve to get the plane back home.

In fact, the 17 has actually taken off on one engine and flown that way from Heston to Dover in the hands of White-Wednesday.

• **Lighting and Reliability—In normal operations, overhead of the engine is started with external power supply on the aircraft batteries. When the prop is up to speed, the other prop is running because of the idling of the**



DOUBLE-POWERED wings make Fairey 17 a small package for easy carrier handling.



technical bulletin

New Electric Power Units Foretell End of Pushbutton Flight... Enter aircraft and motor pilots are pushing electronic flight devices into the forefront. The development of electronic fuel-injection power units to automate engine pushbutton conjunction with automatic pilots in a primary factor in achieving pushbutton flight. Data will now be being produced by EEMCO in close cooperation with the designers and builders of tomorrow's aircraft.

Stabilizer Actuators for Large Jet Fighters... One

with "rodless" movement in the entire actuator used as a new jet fighter. This unit incorporates two motors of different size, driving into individual motors of different size, driving into individual motors of different size. Each gear combination is operated by the screw jack. Each combination is operated by the screw jack. Each combination is operated by the screw jack.



Double Motor Power Unit for Horizontal

Stabilizer... A specially constructed motor arrangement, operates the horizontal stabilizer actuator as a sub-propeller aircraft of recent design. A small electronic relay motor to control the actuator through a gear reduction to control the actuator through a gear reduction to control the actuator through a gear reduction.



EEMCO Design and Testing Service Solves Difficult Actuator and Motor Design Problems... Put us your requirements as sub-propeller aircraft of recent design. Include preliminary data on type of unit, specific function, special problems, operating conditions, motor and actuator specifications and any available drawings, diagrams and tables.

SEND FOR FREE PERFORMANCE CHARTS AND DESIGN DRAWINGS... Executives and engineering and design personnel making request on Company letter head will be placed on mailing list for performance and design drawings of EEMCO designs for file and reference.



ELECTRICAL ENGINEERING and MFG. Corp.

4512 W. Jefferson Blvd., Los Angeles 16, California

and. Windmilling speeds are sufficient to light the engine.

In the air, rotating the dead half of the engine is done by energizing that prop, after top windmilling speed has been reached, the engine is lit.

The production Double Merlin by the Ferry 17 will have a counterweighted arrangement to control prop pitch in accordance with fuel input automatically, with no need for pilot action. A propeller brake will also be built on the production engine to prevent windmilling while on the deck or on elevators.

One other point about production engines for the Double Merlin is only at the beginning of its development life is one certainly be assumed that improvements in both power output and fuel consumption will be achieved.

► **Dimensional Data:** The Ferry 17 weighs in at 34 ft 4 in. spread and only 19 ft 6 in. (folded) overall length at 45 ft. Normal height to top of fuselage is 11 ft 3 1/2 in., with folded wings, this increases only 4 in. to 15 ft 9 in.

Basic design responsibility for the Merlin belongs to D. H. Ellis Williams, Pease's chief engineer.

New Way to Figure Lift Distribution

Spanwise lift distribution can be calculated approximately by an improved method described in National Advisory Committee for Aeronautics Tech. Note 2142.

Basic improvement in this method is that lift distribution can be calculated more closely than by the Schrenk or usual method (NACA TM 941) using about one-eighth of computing time.

► **Four Tests:** Distribution due to any one of four types of wing twist—canted, antiscambered, cambered, or cambered—has been calculated, and the results are of the following nature. Method meets one of the lift distribution due to angle of attack and takes into account the effects of wing aspect ratio.

► **Use of the method:** wing may be from without in the design, from camber distribution, from deflected flaps or ailerons, or from downwash induced by another lifting surface in the jet stream of a wing turbine.

► **By Knowledge:** The report shows that the lift distribution on a twisted wing can be closely approximated by a simple expression. Then it is shown that if both lead and moment twist approximated upon with lift and moment obtained from more exact calculation, then lead distributions for approximate and theoretical cases meet agree.

TN 2142, an Improved Approximate Method for Calculating Lift Distribution due to Twist, is by J. C. Swails of Langley Aeronautical Lab.

British Metals Adhesive Uses

Redux bonding yields improved strength-weight ratios in primary and secondary structural components.

By G. J. Mass*

(McGraw-Hill World News)

London—The applications for metals adhesives in the British aircraft industry have steadily increased since the Redux process was used in the latter years of the recent war for bonding wood to metal for the wing ribs of the de Havilland Mosquito fighter. Early experience with the process was successful enough to encourage its use going well in metal for components of a number of other aircraft (the most recent example being the tail fin of the Canberra jet-propelled bomber) and also in a more ambitious way for bonding parts of all-metal aircraft.

Redux bonding has now been applied to the building of wings and fuselages of the de Havilland Dove, Heron, and Comet bombers, and will be used quite extensively in the manufacture of the Bristol Type 175 jet bomber. Mark II configurations, as well as for the Bristol Type 175 bomber helicopter. The process has been used for fixing stringers to fuselage and wing skins, for making doubly-curved leading edge panels from plain metal and corrugated metal sheet, for local reinforcements at a wide variety of components, for flange and ribs for bonding rubber to metal in and across an engine bay door.

► **Advantages:** Most uses the bonding of local reinforcements to ribs, edges of wingskins, ends of stringers, etc. (where metal bonding already offers advantages over any method which would use the original member by the drilling of holes for mechanical attachment), the process has been extensively used for making wing and fuselage skin panels.

The joining of stiffeners to skins may eliminate large numbers of rivets whose heads add to the drag of the aircraft. Giving avoids a large number of small holes which would occur in riveting stiffeners. It also facilitates the construction of integral fuel tanks. Finally, bonded structures are often stronger than similar riveted ones and appreciable savings in weight are made possible.

► **Savings in Weight:** Some indication of the weight saving may be obtained from the results of tests carried out by Gloster Aircraft Co. Ltd., Bristol Aeroplane Co. Ltd., and the College of Aeronautics. They showed that Redux bonded panels will usually show a 10 per cent weight saving.

*Present location: Aero Research Ltd., Coventry, England, England.



CURVED panel types of these products are available. Curved metal skin is Redux bonded to a panel outer skin.

significantly higher compressive loads than riveted joints, the increase varying with the design of panel but seldom being less than 50 percent and sometimes reaching 100 percent.

It is probable, however, that these static tests do not give a true measure of the superiority of metal adhesives because only under fatigue loading will a continuous (load) point, relatively free from stress concentrations, show its full advantages over riveting.

Work carried out by de Havilland Aircraft Co. Ltd., Hatfield, on repeated loading tests on the wing of a Dove aircraft gave excellent results. When the wing was finally broken after a prolonged series of loadings there was only a slight failure of the Redux bond on either side of a fractured metal strap.

No less promising results have been obtained by Bristol from a varied program of fatigue tests ranging from "constant" tests to complex tests on stiffened panels. It is hoped that later it will be possible to give the results of comparative fatigue tests on both Redux bonded and riveted panels, results to date have suggested the glued specimens have superior strength.

► **New Glue-Strong:** Glue for metals are a quite recent development. The bonding of metals to give joints of high mechanical efficiency is a difficult problem to solve for the following reasons: ► **Metals are not porous.** Therefore glues containing solvents are usually

Performance Points to Pesco First!

12 times around the world . . . non-stop

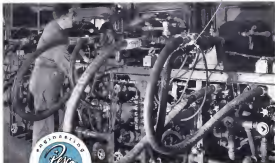
That's a tough trip for any piece of equipment . . . particularly for a fuel pump that must operate continuously, with only gasoline for lubrication, and under varying conditions of altitude, temperature and sudden pressure changes.

But that's exactly the kind of "flight" Pesco fuel pumps take on our endurance test bench "plane." Every conceivable operating condition is simulated on the 549 hour, continuous test run at speeds equivalent to 640 miles per hour or better. This is just one of the many tests to which Pesco engineers subject our fuel pumps to make certain they will not fail when human lives are depending on them.

This kind of accurate research and testing has enabled Pesco engineers to develop aircraft equipment and accessories so good that they have long been sought as standard for both military and commercial planes.

Pesco research methods and precision manufacturing can produce products for you that will help your aircraft . . . in operating in jet . . . operate more efficiently, more safely, over a longer period of time. Why not get the full story? Write today.

This gasoline engine is a Pesco endurance test bench for aircraft fuel pumps. Two 10 hp. and three variable-speed drives, with separate controls for each, and as much as 160 gallons fuel tanks that can be pressurized or evacuated as desired, make it possible to simulate any kind of flight condition.



BORG-WARNER CORPORATION

24700 NORTH MILES ROAD BEDFORD, OHIO



Every Facility to Produce PRECISION GROUND PARTS

Services of single tool and completely automatic turret machines...
rolling machines, horizontal or vertical... modern and complete ground
ing equipment of every type... multiple and single spindle tool centers
with variety of lathe design, turning, carburizing and welding
equipment... and equipment with the most modern precision instruments
facilities for broaching, boring, honing, tapping, grinding, and the many
other operations necessary to produce the most exacting and difficult parts.
We make here precise the specifications are hard, difficult the manufacturing
requirements, Allied produces your hardened and precision ground
parts for you... right... economically... and promptly. Send your
part print for quotation.



ALLIED PRODUCTS CORPORATION

DEPARTMENT 5-1
12427 BURT ROAD • DETROIT 23, MICHIGAN



HARDWARE AND PRECISION TURNING PARTS • ALUMINUM
ALLOY DIE • S-S BUSHINGS AND PISTONS AND LUGS
• STAINLESS CAP SCREWS • SPECIAL COIL SPRING PARTS •
SHIRT METAL DIE FROM THE LARGEST TO THE SMALLEST • JIGS • FIXTURES

to be satisfactory except for very small
amounts of solvent is trapped in a joint,
it will be unable to escape through the
metal and will cause poor adhesion.

• Any glue used must neither give off
volatile by-products in hardening nor
must it acquire any products from out-
side the joint.

• It is difficult to apply the adhesive to
the metal in such a way that the metal
is "wetted." If the adhesive does not
wet the metal, there is no possibility
of obtaining adhesion.

• It must be possible to make it change
into a strong material which is resistant
to solvents and weathering.

• Adhesives should have good cohesive
and adhesive properties. They must
be much stronger than those commonly
used for wood gluing.

• When metals are loaded beyond their
yield point they stretch very rapidly.
Elongation of the order of 15 percent
are not in the least uncommon and
many metal stretch far more before
breaking. Therefore, a joint is to be
made which approaches the strength
of the parts themselves, the joining
material must meet be capable of with-
standing very severe strains before break-
down occurs.

• Adhesives must not corrode metals.
It is difficult to give any explanation
of the nature of adhesion. In gluing
poor materials, the glue penetrates
into the surface of the material and
the joint made by hardening of the
glue depends for a part of its strength
upon the resulting interlocking of ad-
hesive and adherend.

With metals, such a penetration by
the glue cannot occur to any appreci-
able extent and the resulting interlock-
ing accounts for only a small propor-
tion of the strength of the joint pro-
duced. Perhaps the will be more readily
appreciated if it is understood that
bonds may be made quite easily be-
tween polished metal and that their
strength is in no way inferior to those
made between metals whose surfaces
have been deliberately roughened by
shot blasting or wire brushing.

It is reasonable to conclude that in
bonding metals, loss of a difficult
nature from those arising from the
chemical interlocking must also operate.
Such forces are probably the result
of very minute attractions between
the metal surface and hardened glue,
and the effect produced by them is
usually referred to as "specific adhesion"
to distinguish it from the "mechanical
adhesion" resulting from interlocking.

Metals may also be made of the
"pressure welding" of some of the
white metal. The surfaces of the metal
are so thoroughly cleaned and then
pressed together very strongly, some-
times at an elevated temperature.
Under these conditions the metals are
welded together without any adhesive.

possibly by the intermolecular at-
traction across the surfaces of the
metal when brought into contact.

• Metal Pre-Treatments—Before clean-
ing glues, which have been developed
recently for the bonding of metal, it
may be well to mention what the treat-
ment of the metal itself is desirable.
Types of glues used in adhesion in
manufacturing settings of the metal and
consequently a thoroughly suitable
method of degreasing is essential. Two
chlorophene vapor baths have been
used for this purpose for many years
and have given satisfactory results.

It is also important to remove any
contaminants from the metal surfaces. For
example, steel which is rusty or cov-
ered with scale or light films which are
insoluble in any solvent should, prior
to bonding, be rubbed vigorously with em-
ery. Chemical cleaning agents may also
be used, and a service of chrome
and sulphuric acid is known to provide
a reliable method for pickling, also
remains today.

One of the most successful glues for
metals was developed in 1941 by Aero
Research Limited, Dunstable, Cambridge
Trio glue. Modern consists of a phenolic
resin which acts the metal surface,
together with a polyvinyl formal resin
which gives the joint considerable
toughness and flexibility.

The two constituents taken together
study of the conditions which are
prepared for metal glues. The polyvinyl
formal has good mechanical properties,
a high softening temperature and is
resistant to most solvents. But once
under the influence of heat and pres-
sure, it does not act as metal surfaces
satisfactorily. If the phenolic hardens
before the first hardened on the metal
and then the perfect spread out of
it, the metal may be strongly bonded
by clamping them together and curing
the mass at a suitable temperature, e.g.
140-150 deg. C. for 35-50 minutes.
The liquid resin makes possible the
setting which is essential for good
adhesion and then it is pressure with
a hard solid material resistant both to
solvents and to weathering.

• Rubber to Metal—A recent develop-
ment of the Muller process has been
for the bonding of rubber to metal.
Elasticity has been carried out by
heating the metal, followed by
rubberizing the metal. Since it is dif-
ficult to heat plate metal, usually, the
process has in practice been restricted
mainly to bonding rubber to mild steel
by means of Muller, enhanced metal
or synthetic rubber may be bonded to
light alloys, stainless steel, etc. The
rubber is first treated by annealing it
for a few minutes in concentrated oil
shank and, followed by washing, dry-
ing and application of the Muller
solution.

The effect of the concentrated acid



M818 DIFFERENTIAL PRESSURE SWITCH

Specified by Boeing
Engineers for the Boeing B47

Manufacturers like Boeing find Aerotec Pressure Switches best to
control pressure in aircraft such as the B47 Stratofortress, whose per-
formance qualifications are most demanding.

Now in production, Aerotec M-818 is vibration resistant up to 500
cps with 18 g acceleration. It is capable of withstanding surge pressure of
150 psi, without change in setting. Rated for 30 wds DG 3 system
indication, up to 40,000 feet.

AR M818 series Aerotec switches are available for use with water
and, liquid oxygen, water, alcohol, acetone and hydraulic fluids.

Thermostats representative chosen for their engineering background
and years of experience in the aircraft industry are ready to serve you and
world exclusive your company.

Aerotec Engineering Co.
4441 W. 4th St.
Los Angeles 44, Calif.
Leo B. Freeman, Inc.
277 Broadway
New York 7, N.Y.

W. H. Wright
Box 7215
Los Angeles 44, Calif.
Leo B. Freeman, Inc.
277 Broadway
New York 7, N.Y.

John L. Thompson &
1445 East 10th
Tomball, Tex. 7
Aerotec Engineering Co.
4441 W. 4th St.
New York 7, N.Y.

Project and Sales Engineers

THE THERMIX CORPORATION

Greenwich, Conn.

THE AEROTEC CORPORATION

GREENWICH

CONNECTICUT

Designers and Manufacturers of Aircraft Control Valves, Regulators,
Relieving, Relief and Check Types Pressure Switches, Drums, Alarms,
Differential, Strain, Type Pressure-Indication, Test, Safety, and other instruments.

ENGINEERS

wanted at once
for
**LONG-RANGE MILITARY
AIRCRAFT PROGRAM**
by
**NORTH AMERICAN
AVIATION, INC.**
Los Angeles, California

Unusual opportunities for Aerodynamic, Stress Engineers, Aircraft Designers, and Draftsmen, and specialists in all phases of aircraft engineering. Engineering skills other than aircraft may be adaptable through good training program. Also openings for

**Recent Engineering College
and Technological Graduates**

Long-range military program offers fine chance for establishing career in aircraft while aiding defense effort. Transportation to California and established training time. Salaries commensurate with experience and ability.

Please include summary of education and experience in reply to:

Engineering Personnel Office
SECTION 3

**NORTH AMERICAN
AVIATION, INC.**
Los Angeles International Airport
Los Angeles 45, Calif.

to make the rubber surface a little harder and to cover it with fine cracks, usually called "crazing," which are only noticeable when the rubber is distorted. Chemically the change appears to be the conversion of the rubber to various polymers with superior adhesive properties. If the reaction, in fact, is an extremely preliminary, the surface hardening will be very marked and the rubber may be made unsuitable for use. It is often desirable to spread the acid by felt rolls on these sections of the rubber which are to be bonded.

The glue is normally cured in about 15 minutes at 140-150 deg. C., but after longer periods than the 150-200 psi used in metal bonding have been found satisfactory. For rubbers which will not withstand the heating temperature required for curing Refine, a neutral treatment may be added to the resin which reduces the curing cycle to about 20 minutes at 110-125 deg. C. or to about 5 minutes at 140-150 deg. C.

► **Equipment Needs**—To carry out production bonding, it is essential to design and chemically clean the metal surfaces and immediately to apply the Refine liquid and powder. After a period to allow evaporation of the small amount of solvent in the Refine liquid, the parts must be clamped together with a pressure of approximately 100 psi and subjected to a temperature of 140-150 deg. C. for 15 minutes. This temperature cycle is not sufficient to have any appreciable effect on the heat treatment and strength of aluminum alloys, nor is it sufficient to make them susceptible to intermetallic corrosion. Experience to date has shown that it is almost essential for good production work to have all the stages of bonding as one workshop. Whenever efforts have been made to separate and clean

the metal in one part of a factory and complete the bonding in another, there have been occasional times when loose contaminants in solvent and expensive components have had to be scrapped.

Hot patches are now conventionally bonded to steam-heated hydraulic presses and a large number of single-cushion patches can also be built with auxiliary, for example, de Hindland, Hatfield, bonded units using and fracture patches for the Dove as a flat press, and then wrapped them round the fracture faces of wing ribs. This was not difficult because the skins were very thin, but a similar difficult technique can sometimes be applied to thicker skins. Short Run & Hatfield Ltd., Belfast, performed some skins for foot struts, loaded sufficient members to them in the flat press and then allowed them to spring back to the correct curvature after removing the pressure. Needless to say, some experience is necessary to judge how far this method can be pushed.

For dealing with double-curved patches two methods have been devised so far. Hatfield favored the use of an autoclave and has developed the necessary plant to that reliable and economical production is now carried out on a very large scale. De Hindland adopted quite a different technique. They have loaded struts to double-curved shape in 10 ft. in length in a large, narrow steel heated press, with both members to the correct curvature to apply the pressure necessary for bonding. In this equipment, they give one strut at a time to the wing or fuselage skin.

► **Skins in Cast Weight**—The construction which a metal bonding can make to savings in cost is twofold. Because of the savings in structural weight, the structure can carry more payload and

even more stress. And Refine has already led to savings in the cost of producing aircraft.

This can be seen most clearly from a comparison with the work involved in welding 4 in. by 12 in. patches for the Dove. On such patches there are about eight "top-kick" strengtheners, running parallel to the longer sides. Each would have two rows of rivets, for which it would be necessary to punch the holes in skins and stringers, to counter-drill the holes in the skins, and then to put in each rivet individually. Finally, on the other hand, may be carried out in a total time of about 1 hour after designing and chemical cleaning, and has the additional advantage that all the attachments are made in the one operation.



REFINE uses Refine bonding for fabrication of single sandwich structure ribs. Single one on right-hand side is lead-lined oil.

► **Methods Compared**—Having given this description of metal bonding at present available in Great Britain, let us compare these briefly with others.

For many years engineers have used rivets to join sheet metals, but this method suffers from a number of disadvantages. Sometimes it is unsuitable because of the unsightly appearance of the rivet heads, in aircraft construction, their aerodynamic drag causes a loss of speed and range of the aircraft. In addition, it is now widely recognized in the British aircraft industry that Refine bonded structures are often stronger than riveted rivets.

The braze and soldering of light alloys, although sometimes practiced, are hardly the simple and reliable processes which they are for joining steels, cast-iron, soldered joints have a poor resistance to corrosion. Spot welding

Vital jet engine parts— PROOF of Parker Precision!

The reason manufacturers of jet engines and aircraft are turning more and more frequently to Parker for vital new parts, including valves and related components for fuel and hydraulic systems, is to be found in the skills and know-how of Parker craftsmen. They are skills and know-how that result in precision-machine-d parts, accurate to the minutest detail, that fit perfectly into the "Clock-Work" mechanisms of aircraft. They are skills and know-how that perhaps can solve a troublesome problem for you.

THE PARKER APPLIANCE COMPANY
13555 EUGEN AVE
CLEVELAND 15, OHIO
8037 W. CENTURY BLVD.
LOS ANGELES 45, CALIFORNIA

Parker
FUEL FITTINGS
VALVES - O-RINGS



NEW...
yet proven



COHRLASTIC
SILICONE RUBBER
CASSET SHEETING

For Operating Temperatures...
-100° to + 500° F.

Connecticut Hard Rubber elements have built our temperature range once into COHRLASTIC Fabrics.

These silicone rubber-coated fiberglass materials remain soft, flexible and resilient over an extremely wide temperature range.

Meet AMS 3315 and QM MIL-T-10035A

Their excellent resistance to hot or cold makes them ideal gasketing under conditions that cause other materials to harden and leak. Thousands of applications have proved their effectiveness. Equally good sealing is obtained at very low temperatures... an important feature for refrigeration, aircraft or refrigeration work.

COHRLASTIC fabrics may be readily cut to size or die-cut to form gaskets... or are obtainable in the form of finished gaskets.

Send for technical data sheets giving physical properties

The Connecticut Hard Rubber Co.

414 East Street, New Haven, Conn.

- * Gaskets
- * Diaphragms
- * Ducting
- * Conveyor Belts
- * Heat Sealing Jaws
- * Boiler Sealing
- * Expansion Joints
- * Press Covers
- * Electric Insulation
- * Low Temperature Service

as thus for their bureau of the good electrical and thermal conductivity of aluminum and its alloys. Heavy cut with and an accurate control of current, pressure and time of welding are accuracy, and even then, spot welding can usually be applied only to sheets of approximately the same thickness. No such limitations occur in plating, which can be used effectively for joining, extrusion, die-casting, sheet or castings or solely various fasteners.

Back Arc Welding—A method for joining sheet between light alloys which has advanced rapidly in recent years has been electric arc welding in an atmosphere of argon gas. The inert argon gas effectively prevents oxidation at the junction and thereby eliminates the need to use fluxes to liberate the metal. There are still disadvantages in its use, however, not the least being the relatively high cost of argon and of skilled welders. And, of course, arc power depends upon leaving the metal to its melting point without the properties produced by careful heat treatment. It also introduces the risk of distortion of the components.

It is comparable to methods that for many applications, metal joining processes possess advantages which are actually striking to encourage engineers to make the quite drastic change in production methods which their inflexible requirements. If, however, the same same advantage is to be obtained from this innovation, it requires an even bigger change in the outlook of the designer than it does in that of the production engineer.

Motion Sickness Program Pushed

The Air Force School of Aviation Medicine has announced a joint project with the Army and Navy to study the effects of motion drugs and drug combinations as preventive or control actions.

Major purpose of the project is to find a medicine which gives the best motion-sickness protection with the least side effects. The study of experiments is in extension of those conducted a year ago in which soldiers aboard an Atlantic transport were given drugs, under controlled conditions. Recently, which was found last year to be one of the better preventives, will be used in the control drug this time.

For the three-service project, Army personnel the study is subjects, Navy the ships and a medical officer for each and the Air Force conducts the study.

Ships are being used instead of an aircraft to save time through the increase in the number of sea-time which can be preferred in a given time.



Visor Adds Safety In High-Speed Bailout

New protection for jet pilots in the full face case that contains the helmet during a high-speed bailout. Developed by Branch & Louth Optical Co. for the Air Materiel Command, the clear plastic shield is mounted on the helmet by a metal yoke and holding plates.

Fixed down over the pilot's face, it locks in place, safeguarding against opening of an ejection seat which would tear the helmet off the head. Trained with the helmet, it keeps the oxygen equipment with the pilot and shields protection against head injury. When not in use it can be pushed up out of the way.

Development combination recently was successfully tested at McClellan AFB, New Mexico. Visor is now in production.

New Autopilot Allows Unlimited Maneuvers

Now, manhandling any given are the least of a new electrical autopilot, featuring unlimited maneuverability, just announced by Westinghouse Electric Corp.

Designed to the specific and some sensitive automatic pilot ever built, the device is slated for installation in the F-94C all-weather fighter being built by Lockheed Aircraft Corp. for the U. S. Air Force.

Joint Venture—Several years of basic research and flight testing by Westinghouse research pilot more than a year of development work at Wright-Patterson AFB, Dayton, O., led to the final instrument.

A test model was flown for over 60,000 miles in an F-52 Twin Mustang during the program's research phase. Westinghouse says that the auto-

MEMO
to Aircraft
Manufacturers...

PACKARD is
"Mr. CABLE" in
your industry

Long before the building of airplanes reached the dignity of an industry, Packard was supplying cable to its experimenters and its pioneers.

An electrical problem developed in the aviation field, Packard was ready with new materials, new processes and new equipment with which to assist in their successful solution.

Today, Packard is the preferred wiring in commercial and military aviation... "Mr. Cable" himself.

Packard
CABLES
PACKARD ELECTRIC WIRING
FEDERAL AVIATION CORPORATION
MADE, OHO

WAL Purchasing Unit Feels Pinch

Traffic build-up and "insulation scarcity" add up to a linguistic headache for Western Air Lines purchasing department.

Robert Korte, WAL's director of purchasing, Harrison Munson, figured he had it made. Western's Los Angeles headquarters was a highly diversified area and supplied most of WAL's needs. Western had 1080 local suppliers, only 600 shipped. Its plane makers, Boeing in San Diego and Douglas in Santa Monica, likewise were nearby.

This easy supply situation enabled Western to keep one of the lowest inventories in the industry. Western kept a maximum of 45-60 days supply on general supplies, turned over its entire inventory three times a year.

Now Western expects it will have to stretch far afield, accept many substitutes, build bigger inventories, and pay more for the thousands of things it needs to keep flying.

• **Lead Time Up**—Munson's latest setup developed cracks even before Korte. First, traffic volumes required higher inventories. But scarcity and hard-to-get things which started turning up in late summer posed the biggest problem. Lead time of all merchandise has gone from 45 to 90-120 days and in some cases to 180 days. As a result Munson now tries to anticipate his needs

6 to 9 months in advance instead of the former 1 to 4 months.

Scarcity also brought with it the industry's standardization program. Through Western carries 37,500 items on its Cards, some, ones about 1950 or 2000 equivalent items, it was able to build up a standardization program which "saves a lot to us." Now Munson will have to build a bigger inventory to cover substitutes.

Another aspect of scarcity already showing up, Munson says, is the disappearance of many brands. "You can't always get the Dow Corning Seal and so you can get practically the same thing with another brand name and at a higher cost."

• **Costs Up**—Munson figures supplies and equipment will cost Western 50 to 25 percent more overall. That is, things he bought last year will cost that much more. How much more he'll have to buy because of increased tax for both and longer lead time, he doesn't know.

The aircraft operator 18 Boeing 740s, 5 DC-4s and 13 DC-7s. Its standardization program is complete and it doesn't plan any additional high density conversions because of increased costs.

Traffic in the winter months already is up sharply. Inventory was 18.3 per cent over the previous year. The first nine months of 1969 Western reported a 65.9 percent increase in revenue.



NATIONAL AIRLINES' "BIG WHERE"

Since the 747 option was studied at National Airlines' Miami headquarters a month ago to explore alternatives, now NAL's design team is working on a study to a party of six to those passengers. Only when a "certain" is reached must

space be cleared through central control. The "Big Where" weighs half a ton but weighs on a standard DC-4 as much as 1000 lbs. In respect to load, NAL's designers are not too concerned.

over-passenger seats, and a doubling of cargo bin rules. Mobilization is bound to build traffic even now. WAL's route system shows a big expansion in the western states' military installations, airline bases, navy bases, and procurement offices. Its industrial sales associations have doubled in recent months. Big companies are sending their people out in convoys for outdoor meals wherever they can find them. They get better results by flying vans than they do by sitting in plane cabs.

Airline traffic booster is the planning of a "little capital" in San Francisco. Los Angeles businessmen, who already commute heavily on the high-speed Los Angeles-Fresno train, will need to make more trips to the regional capital.

PanAm Seeks To Open Operations to Tahiti

Once obtained, Tahiti now is setting the station of U.S. airlines.

Most recent development is that Pan American World Airways has sought full permission to operate there. PAA would connect Tahiti with French Polynesia Island and Australia Samoa and says it can start a month after approval is granted.

A new airline, Tahiti-Hawaii Airways, made the first Honolulu-Tahiti, round-trip in January, using a chartered Transocean Air Line DC-7. It plans monthly flights from now on (Aviation Week Feb. 12).

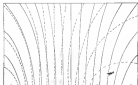
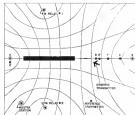
After PAA made its announcement, TAA announced receipt of a French government franchise to operate the Honolulu-Tahiti route and it will operate as a French corporation. It is now a French partnership.

TAA also announced purchase of a Comoros. Midland amphibious plane for \$150,000 to use for inter-island service between Bora Bora and Papeete, a 150 mi. flight.

CAB Issues Findings On Michigan Crash

Findings of the Civil Aeronautics Board on the Northwest Airlines DC-4 crash June 23, 1959, at Boston Harbor, Michigan, listed to all 35 passengers and crew of those, are:

- There is not enough evidence to assign one probable cause of the accident. Time of crash is estimated at 35 minutes before midnight June 23.
- Crew was thoroughly briefed before takeoff, including a forecast of weather data, aircraft and possible development of a low aquit.
- Squall line was described and located in a radio forecast issued one hour, 40 minutes before the accident.



RAYDIST PLAN VIEW (left) shows how plane is tracked through thousands of hyperbolic lines that form a grid. Airline compass set by Raydist (right) completes the three-dimensional grid that locates any object in space, with one inch error per mile distance.

Raydist

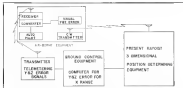
New position-measuring device claimed to have error of 1 in 5000 ft.

A new highly accurate aircraft position-measuring system was delivered to Wright Field Air Weather Flying Division last week by Hastings Instrument Co. The development contract for the new equipment—called Raydist—was let by Air Weather and sponsored by Air Navigation Development Board.

Raydist will measure position with an error of only one foot for every mile the plane is from the ground station. Air Force will use Raydist's extreme accuracy to verify operational and developmental models of the ILS, PALS, OCA and other gear that must project or indicate positions in space, where accuracy is very hard or impossible to check. (Aviation Week Feb. 12, 41.) Weather has also ordered from Raydist a radio beacon gliding board to track aircraft positions as given by Raydist readings.

Altitude measurement with Raydist is still somewhat controversial, demanding a number of ways to achieve accuracy at different points. But altitude measurement applications of Raydist is broad and may be expected to become unqualified through development.

- **Many Uses**—High accuracy of the Raydist system, regardless of ground or weather conditions, makes it a candidate for many air and surface jobs, including weather tracking and direction. Current range used with Raydist air up to 170 mi. But increased power output can raise the range as Raydist depends on low-frequency radio, which cannot exceed the earth's surface.
- **Some Current Applications** of Raydist include:
 - **Surveying**. A standard line of Raydist navigation gear for hydrographic sur-



PROPOSED AUTOMATIC LANDING system by Raydist plus conventional equipment.

veying has been developed for commercial use and is used by the Corps of Engineers.

- **Surface navigation**. Hastings in 1949 developed an automatic navigation and timing system for Navy Bureau of Ships.

• **Fixed craft**. The aircraft position measuring equipment installed at Wright Field last week is the first official three-dimensional position measuring equipment developed and delivered by Hastings. With that gear to determine distance accurately of one foot error per mile range, Hastings now hopes to get into automatic aircraft timing, navigation, landing, timing, and other applications.

• **How It Works**—Raydist is a system of electronic measuring. A ground station with two or more small aerial stations takes a carrier wave signal from any transmitter that is turned on as an airplane.

Position is fixed by comparison of the phase angles of continuous waves that follow different hyperbolic paths that locate position through a grid of miles waves very close together. The system is comparatively easy. It is powered by the receiving antenna, which Hastings, and first significant

application was made by Hastings in automatic aircraft ground speed on test run in 1940.

Proposed layout of the system for automatic landing with or without automatic landing signaling involves the following. Raydist equipment recently developed by Air Weather Flying Division:

- **Master station**, mounted on the rear of a truck or in a control tower.
- **Auxiliary transmitter**, in each plane, which may be either the existing master equipment or the a special 12-watt transmitter developed by Hastings.
- **More than nine relay stations**.
- **These together give all the signals and readings necessary for instrument landings and even timing on the ground, the company estimates.** A combined type compass and altimeter complex could do the rest, the company says.
- **Raydist operates on any frequency from one to 30 Mc.** The equipment recently demonstrated operates on 9.10 Mc. A complete revision of the equipment's phase comparison data indicates one-half wavelength, or 5 ft., change in the difference between the two paths of transmission. The phase

SMALL RADIO DIVISION



ELECTRONICS ENGINEERS—do all safety and equipment levels

RESEARCH ON Avionics, Servomechanisms, Automatic sets and other phases of communications and navigational equipment

PRODUCTION DESIGN OF Avionics and mechanical communications and navigational equipment

FIELD ENGINEERS — Super elite specialists and maintenance of radio and order equipment. Factory training will be given. Best salaries from \$4000 to \$10000 per year 20% bonus for long term experience traveling and living expenses paid by Bendix. Immediate reply

RIS AND INSPECTION ENGINEERS — Special knowledge of radio, radar, or TV manufacturing processes. Good knowledge of radio fundamentals essential. Best salaries from \$3000 to \$10000

REPAIRING WORKERS — Knowledge of radio fundamentals in radio or repair work. Study with engineers to gain technical for maintenance and maintenance records. Best salaries from \$2000 to \$10000

LABORATORY TECHNICIANS — To gain knowledge of radio, radio, radar, or TV manufacturing processes. Good knowledge of radio fundamentals essential. Best salaries from \$2000 to \$10000

BEST SALARIES FOR ALL POSITIONS LISTED ABOVE ARE GUARANTEED BY UP TO 20% BONUS INCENTIVE SCHEDULE. NO HIDE HERE

Resulting a no problem in between.

Excellent group insurance and health/benefits plan.

Also offers retirement plan for professional personnel.

Write for application.

Employing Personnel Supervisor
BENDIX RADIO DIVISION of
Bendix Avionics Corporation
Bloomington 4, Maryland
FD-200 1008

more and a dangled into 100 parts, as each little wadley in the end indicates a movement of about 6 in. along the line printing alloy catalyst.

Two or more relay systems along the outside of runway approach give absolute readings. Two or more relay systems can each side of the controller give accurate indication for bearing a plane down the controller.

Overseas War Risk Insurance Coming

Overseas aircraft operators unable to get insurance against war risks from private companies will probably be able to obtain it from the government soon. Legislation authorizing the Secretary of Commerce to offer such insurance has been approved by Senate Judiciary and Foreign Commerce Committees. There is general agreement on the measure, and it will probably be enacted shortly.

Department of Defense new aircraft policyholders defense work under contract. The government assistance is needed for commercial operations.

If an operator must take the war risk, Air Transport Line's executive vice president, Robert R. Rappaport, as planned. The war risk, however, is a matter of which is desirable to the operator or in the national interest. First, he may simply want operations in a danger area, which would threaten the commercial or he can continue to operate and maintain his aircraft with a certificate to compensate him for the risk. Under the law, this would make for a sharp rise in transportation costs, and would be reflected in the cost of the goods carried.

The Secretary of Commerce is at work authorized to offer war risk insurance to shipping companies. In the last war, the Marine War Risk Insurance Program turned out to be a profitable undertaking for the government, with premiums more than balancing claims paid.

War Damage Corp. is anticipated,

will be restricted to offer insurance against war risks of all types in the United States. Because of this, the aircraft war risk insurance now operating does not provide insurance for operators wholly within the continental U.S.

Under it, Secretary of Commerce, after consultation, would set premium rates for insurance and reinsurance for the following:

- American aircraft and foreign flag aircraft owned by U.S. citizens or engaged in operations considered as the national defense.
- Crews and passengers on such aircraft against loss of life, injury, or property.
- Personal effect and baggage of crews and passengers.
- Cargo, including express or registered mail.

Fiscal Report Shows Tigers Flying High

The Flying Tiger Line posted \$1,355,925 in the October-December quarter, with net profit of \$155,750. That brings profit for the first half of Flying Tiger's fiscal year to \$375,403 after taxes, or \$116 a share.

The air freight company's prospects are for business to hold up at that level in the present half. Tokyo will open lines of service DC-4s at helping with volume and profits.

These earnings are after charging off a reserve of \$500,000 against possible insurance loss payments.

Volume for the October-December quarter set a new high, but profit was down from the first quarter because of labor cost increases and a selective decrease price reduction on the Tokyo route, thought against the national objective.

The company on Dec. 31 showed for the first time a record surplus of \$745,912. Current assets of \$1,355,925 compared with current liabilities of \$1,111,215. The company has no long term debt, or preferred stock.

SHORTLINES

► An Express-Jetliner or Express Jetliner through new terminals totaled 115,151 in new. High for January and second highest number for any month, topped only by December. Number of shipments was up 35 percent, revenue (\$151,150) up 41 percent over a year ago.

► Alaska Coastal Airlines—ACA traffic in 1950 was best ever for all types passengers up 15 percent to 26,144; charter flights 222 trips, cargo and mail 1,254,000 lb. ACA new over 14 planes, including a Catalina and six Grumman. The 1950 payroll was \$388,000.

► All American Airways—Company is growing plans to all border companies now on active military duty, to fly the active line whenever a vacant seat is available, or half fare rate on a reserve line.

► Boeing Field—Seattle's King County Airport has lost one land surface runway and a parallel lightplane strip. Yet 143,571 landings and takeoffs last year topped the traffic at 114 million Seattle Tacoma International, four miles away. Field was not closed down for any 24-hour period in the year.

► Bonair International Airways—An economic survey of the states served by Bonair's routes a 10 to 15 percent gain in retail sales and 18.25 percent in industrial production for the region around has put out an attractive booklet on the economic study. BIA has signed a five-year contract to carry Panama mail.

► British Overseas Airways—BOAC's Strakerman staff has flown 47 million miles under introduction on Trans-Atlantic routes December, 1949.

► Colonial Airlines—Bernards traffic of Colonial in 1950 posted 33 percent over 1949. Despite current record of volume loadings, Colonial will keep the \$53 fare it started last spring.

► KLM Royal Dutch Airlines—Cut size 75 day aviation fares. Glasgow-Antwerp on Conquest-Lorient will reduce fare 25 percent to 10 pounds 10 shillings for the return trip, starting Apr. 15.

► International Air Transport Assoc.—Four European airlines are using callage instead of money for frequent traveler ticket debts and credits. They are BEA, Swissair, KLM, and Dutch Air.

'most any aircraft job...



goes faster, surer, easier

with Snap-on Tools

Nobody needs to tell a ground crew man how the mechanics and boxes (we pile up on an aircraft job when the right tools are available. That's one of the big reasons Snap-on professional mechanics' tools are so universally used. They're designed with experience, built with care, of alloys scientifically selected to make the strains involved. They fit. They stand up. They help any mechanic to be a better mechanic, by giving him skill full scope. The range of Snap-on Tools is complete—there are more than 4,000 of them. And, for information regarding special aviation tools in quantity rates, write the Snap-on factory.

*Snap-on is the trademark of Snap-on Tools Corporation

SNAP-ON TOOLS CORPORATION
MILWAUKEE 24, WISCONSIN
Exclusive, Wisconsin



GREATER CRUISING RANGE AND SPEED sell more PLANES!



Offer more than competition with Aero-matic's world's only automatic variable pitch propeller for personal planes. Adds speed, range and safety. Select best engine planes handle like a dream! Find out for yourself, write for literature today to Koppers Co., Inc., Aero-matic Propeller Corp., 310 Scott St., Baltimore, Maryland.

The propeller with a built-in personal plane.

Aero-matic

(Universal photo of David Propeller Corp.)

ENGINEERS**Build your future with a young company with expanding opportunities**

Immediate openings for qualified men with engineering degrees, or experience in airplanes, guided missiles and helicopter engineering, particularly in:

**AERODYNAMICS
DESIGN
DRAWING CHECKING
ELECTRONICS
FLIGHT TEST
FLUTTER AND VIBRATION
HANDBOOK WRITING
ILLUSTRATION-TECHNICAL
SERVO MECHANISM**

**STRESS ANALYSIS
STRUCTURAL TEST
TOOL DESIGN
WIDGET CONTROL
AFTERBURNER DESIGN
JET ENGINE CONTROLS
POWER PLANT ANALYSIS
JET ENGINE DESIGN
THERMODYNAMICS**

SERVICE ENGINEERS

Limited number of openings also available for mechanical engineers, engineering trainees and electronic technicians.

Top starting pay . . . rapid advancement based on individual merit . . . liberal employee benefits . . . bonus for extended work weeks

Send resume of training, experience, data available to

MCDONNELL AIRCRAFT CORPORATION

"Home of the Bomber"

Post Office Box 516 St. Louis 3, Mo.

**BENDIX AVIATION CORP.
PACIFIC DIVISION**

OFFERS IMMEDIATE POSITIONS IN ENGINEERING FOR THE DEVELOPMENT OF GUIDED MISSILES, RADAR, SONAR, SALARY COMMENSURATE WITH EXPERIENCE, TRAINING & ABILITY.

SENIOR ENGINEERS For laboratory design & test & instrumentation, sensing instruments & servo-mechanisms.
JUNIOR ENGINEERS For laboratory design & test & build tests of electronic equipment.

SENIOR & JUNIOR ENGINEERS For the design of servo-mechanisms, pulse circuits, amplifiers, antennas, VHF-UHF, transmitters & receivers.

Permanent employment in modern factory with excellent working conditions, including health insurance & vacation plan.

Periodic wage & promotion review.

Address Reply: ATT: ENGINEERING PERSONNEL AOR.

**BENDIX AVIATION CORP.
PACIFIC DIVISION**

11600 Sherron Way No. Hollywood, Calif.

AERONAUTICAL ENGINEERS

Independent Research and Development Organization in Virginia has openings for responsible men

Senior Aeronautical Engineer or Physicist

Ph.D. degree, or M.S. plus equivalent experience in research and development with the Project Lambda in field of internal and external aerodynamics of guided missiles and propulsion systems. Ability to organize and report progress of a research group is essential, as well as capacity to apply both qualitative and quantitative methods to performance problems.

Associate Aeronautical Engineer or Physicist

M.S. degree, or B.S. with 3 to 5 years' experience in research and development work, for responsible position in theoretical and experimental studies of guided missiles and propulsion systems.

Junior Aeronautical Engineer or Physicist

B.S. or A.E. degree with high scholastic standing, one to two years of research experience preferred, but not essential. Please give complete information in resume. Our personnel have been advised of this offer. Reply to:

EXPERIMENT INCORPORATED

P. O. Box 312
Edmond 2, Virginia

PROJECT ENGINEER

Project development of new equipment for aircraft, aerospace and commercial applications. Opportunity with a future as well established and progressive firm. Salary commensurate with ability and experience. Submit resume of education, experience and salary desired.

Mr. C. E. Reddy
STEWART-WARNER CORPORATION
South West Division
1574 Denver St. Indianapolis 7, Ind.

WANTED**FIXED BASE OPERATOR**

Must be a resident of the United States, have a high school diploma, and be able to read, write and speak English. Send resume to:

JACK C. FITTS
P. O. Box 424
Baltimore, Md.

WANTED**SALES ENGINEER**

Large mechanical company with expanding sales territory in the South and West. Must be a resident of the United States, have a high school diploma, and be able to read, write and speak English. Send resume to:

Mr. J. C. Fitts
P. O. Box 424
Baltimore, Md.

At Your Service . . .

The Searchlight Service is at your service in any location where an experienced, experienced and well-trained personnel are needed. We are currently looking for experienced and well-trained personnel with the following qualifications:

**... Looked in California this year as important position - new**

Looked openings to participate in a long range development program, developing the design of the future.

Looked offers of extensive salary plan, a future in mechanical sciences, a chance to live and work in Southern California.

Looked also offers a generous credit allowance to those who qualify. Looked has immediate openings for



Wrote today - giving full particulars as to opening and conditions. Address: Aircraft Engineers, 10000 Wilshire Blvd., Suite 1000, Los Angeles 40, California.

**AC SPARK PLUG
DIVISION****of
GENERAL MOTORS
CORPORATION
PRECISION INSTRUMENT PLANT**

Positions now available in high-level position in the field of advanced electronic electronic control equipment.

MECHANICAL DESIGN ENGINEERS**ELECTRONIC ENGINEERS****SERVO ENGINEERS****JUNIOR ENGINEERS****MECHANICAL DESIGN ENGINEERS****ELECTRONIC ENGINEERS****SERVO ENGINEERS****JUNIOR ENGINEERS****MECHANICAL DESIGN ENGINEERS****ELECTRONIC ENGINEERS****SERVO ENGINEERS****JUNIOR ENGINEERS****MECHANICAL DESIGN ENGINEERS****ELECTRONIC ENGINEERS****SERVO ENGINEERS****JUNIOR ENGINEERS****MECHANICAL DESIGN ENGINEERS****ELECTRONIC ENGINEERS****SERVO ENGINEERS****JUNIOR ENGINEERS****BELL AIRCRAFT CORPORATION**

offices

ENGINEERING OPPORTUNITIES

in the

research-development-design

at

AIRPLANES-GUIDED MISSILES-HELICOPTERS**Openings in the East for**

**AIRPLANE ENGINEERS
ELECTRONIC ENGINEERS
ELECTRO-MECHANICAL ENGINEERS
RESEARCH
ELECTRICAL DESIGNERS
AND MECHANICAL
ELECTRICAL DESIGN
ELECTRONIC DESIGN
ELECTRICAL EQUIPMENT
TEST ENGINEERS
ELECTRICAL SYSTEMS
TEST ENGINEERS
ELECTRO-MECHANICAL ENGINEERS**

**MECHANICAL ENGINEERS
AND MECHANICAL
ELECTRO-MECHANICAL ENGINEERS
RESEARCH
ELECTRICAL DESIGNERS
AND MECHANICAL
ELECTRICAL DESIGN
ELECTRONIC DESIGN
ELECTRICAL EQUIPMENT
TEST ENGINEERS
ELECTRICAL SYSTEMS
TEST ENGINEERS
ELECTRO-MECHANICAL ENGINEERS**

Address: Manager, Engineering Personnel

BELL AIRCRAFT CORPORATION

P. O. Box 1, Yonkers 1, New York

Openings in the West for

**ELECTRONIC ENGINEERS
ELECTRO-MECHANICAL ENGINEERS
RESEARCH TEST ENGINEERS**

**ELECTRONIC ENGINEERS
ELECTRO-MECHANICAL ENGINEERS
RESEARCH TEST ENGINEERS**

Recall or Middle experience desired

Address: Field Test Director

BELL AIRCRAFT CORPORATION

P. O. Box 211, Redlands, Air Force Base, New Mexico

**AIRCRAFT ENGINEERS
WANTED**

Stress Analysis
Test Engineers and Designers
Production Planners

Only men with solid experience who are not over-relied by aircraft companies and who are not over-relied by previous employers.

Men who will be able to work with great confidence in their own engineering capabilities.

Men who will be able to work with great confidence in their own engineering capabilities.

Men who will be able to work with great confidence in their own engineering capabilities.

P-9106, American Work
320 N. Michigan Ave. Chicago 11, Ill.

WANTED**GENERAL INSTRUMENT
REPAIR MECHANICS**

Good pay-good hours conditions. Send resume to: Mr. J. C. Fitts, P. O. Box 424, Baltimore, Md.

IMMEDIATE OPENINGS

FOR

ENGINEERS

in the beautiful San Francisco Valley of Northern California

ENGINEERS interested in joining a Young, Progressive Company. Participating in the Development of the Southern California and Related Enterprises—Top Pay with Ideal Working Conditions—Apply

Address: Mr. J. C. Fitts, P. O. Box 424, Baltimore, Md.

Address: Mr. J. C. Fitts, P. O. Box 424, Baltimore, Md.

Address: Mr. J. C. Fitts, P. O. Box 424, Baltimore, Md.

Address: Mr. J. C. Fitts, P. O. Box 424, Baltimore, Md.

Address: Mr. J. C. Fitts, P. O. Box 424, Baltimore, Md.

Address: Mr. J. C. Fitts, P. O. Box 424, Baltimore, Md.

Address: Mr. J. C. Fitts, P. O. Box 424, Baltimore, Md.

Address: Mr. J. C. Fitts, P. O. Box 424, Baltimore, Md.

STRICTLY PERSONAL

(Without the slightest difficulty, we have persuaded Her Editor H. A. Van Flusen, M.B.S., to produce today's column. We praise the good Editor.)

JUNE IN JANUARY—While you restaurant folk sit without business coming up from Florida I send along the following, in anticipation of the coming summer. In parenthesis, we call the same.

"It's not the best, it's the honest!"
 These are words of their stupor,
 None of you'd say it as you ought,
 Say, "It's not the transference, it's the weight!"

READ THE METER, METER, PLEASE—Our John A. Leonard of Memphis, Miss., has taken umbrage at one of my poems which ran in the monthly page of *Aviation Week*, and I address to him these words:

"There be chamberlains I make you very curious about my poems, I have the methods of 'morning' poetry (O) make you see it as Gilbert & Sullivan melody, as [I] I mean 'run off' as my fingers. The poem is to which you made reference was 'measured' by the digital method and, when I put it in to the editor, the meter was correct-I think. The problem was, my editor has only one finger on his left hand and, since he checked the fifth line on my right hand and the sixth line on his LEFT hand, the results at print were slightly 'rearranged.' If he were NORMAL, his left and right hands would be equal and the poem would be correct. I have a letter from him dated 18 Nov. '80. Concerning their rearranging the letter of ANY line--Barnes H. A. New Haven.

Forrestal ignores a brutal excuse
 for indulging in terrible illegal abuse,
 is something THIS writer would like you to note
 is almost funny anything he's ever wanted
 to do.

MY LETTER TO LIFE MAGAZINE—I have sent the following letter to the publishers of Life Magazine. It was several months ago but my editors in New York have just received this previously forgotten addition to the Van Hagen priority correspondence. "Continued." It was with the greatest reluctance that I finally had to end the 10th. I mean of Life, continue this incredible hoax GEOGRAPHY OF THE UNIVERSE.

and the underground were among the first to attempt to stimulate the photoperiodic response at photoperiods by that

²Although critics of the more conservative judicial appointments have posed the question 'Can the inverse differentiation of the Third order actually produce robust investigations?' this order is in a position to state unequivocally, *NO*!

The above facts, combined with the so-called "ideological" mathematical manipulation of certain scientific areas, has resulted in one of the most startling developments to date, the simulation of the nonhomogeneous continuous cultural systems.

These matters are brought to your attention in order to send any possible responses—as a result of your careful coverage of the investigation—first to your superior, the *decano* of the school, and second, at some time in the foreseeable future, to the

Well, to my surprise, I got a nice dead-pen letter back from William Rich, assistant to the publisher, saying he has put me on their mailing list to receive payments of these money-writes. What I want to know is, who is behind this?

MOST SENSIBLE STATEMENT OF THE WEEK—We've been asked to withhold our name because he works for a certain pest agency, but he used it while discussing the new Part 3 of the civil air regulations: "Who with that, they can get along without the GAA just as well as with it."

MAKE HAY WHILE YOU EAT—Al Minetti, the recently predeceased agent, is usually accused of taking advice of silence with a grain, particularly when they're trying to sell HIM. However, while discussing properties with a real estate sales person, recently he walked up a hill to his back apartment with a real estate salesman. "Young man, I'd advise you to get a lot while you're young."

[illegible]

WHAT'S NEW

New Books

D. W. Ferris, in *Cloud Physics*, has put together a very readable book as a thorough study of the makeup of cloud forms and their actions. The writer speaks of his subject from first-hand knowledge, being meteorologist for the British Columbia Forest Service and also a member of the Committee for the Study of Clouds and Hydrometers of the International Meteorological Commission.

Although much space is given to the rational phases of clouds, a substantial portion of the book covers observing, forecasting, and flying. The rare stratospheric mammae and noctilucent clouds are also described, as are optical and electrical phenomena. A comprehensive chart of cloud characteristics giving detailed specifications is included at the end of the volume. Various cloud formations are illustrated.

Published by John Wiley & Sons,
Inc., 440 Fifth Ave., New York 16, 119
pages, including indexes, price \$4.90.

Telling the Market

Handy pocket size brochure, **Bendix Ignition Analysis and Associated Equipment**, describes the equipment, using a question and answer format, and includes schematic diagrams. Write Scientific Materials division, Bendix Aviation Corp., Sidney, N. Y. — 32 pages annual, **Let's Buy to Bend**, fully illustrated with clear and simple drawings shows numerous products applications of the Aero products; it is available from Q-Net-Flow Mfg. Co., Lake City, Minn.

Aluminum alloy protection and paint adhesion coatings are covered in detailed report of a paper, **Amorphous Phosphate Coatings for Protection of Aluminum Alloys and for Paint Adhesion**, a paper by Alfred Dorst and F. F. Sparacino, Jr., presented at national convention of American Electroplating Society. Write the American Chemical Society, Inc., Analytical Div.

Detailed planning data for installation of medium intensity airport lighting for small fields and for secondary runways and taxiways at large airports can be obtained from Lane Materials Co., Airport Lighting division, East Stroudsburg, Pa. Technical reports containing comprehensive data on new technical developments on field lights are looking for the aviation industry can be obtained from Fisher & Pease Co., 1750 Country Lane Road, Harbor, Pa.

ADVERTISERS IN THIS ISSUE

— Case Published —

TABLE 10. 1955-54 Edition

**ALL THE WORLD'S
AIRCRAFT**

Facts and figures on both civil and military aircraft of the world.

"Look it up
in *Index!*"

This phrase has become a tradition in this country and industry throughout the aviation world. Each time to a combination of ideas on the survival of all aircraft made possible only by the cooperation of manufacturers, service organizations, technicians, pilots and independent maintenance all over the globe.

Compiled and edited
by Lawrence H. Hogueman
Cover story page 18 by a
staff writer.

DEBATE NINETEEN Fully revised and brought up to date to mid 1999, this section is a head-to-head contest of the up-front leaders of the debate together with details of their individual views, including statements and recorded use of national marketing. Details also include the history of Hungary, from Deák's death to the communist regime of the late 1980s.

THE APARTHEID Lists the names and addresses of the governmental departments, organizations, institutions, companies, individuals, student unions, and various institutions of all countries of the world.

FRANKESS Freebies access to linked list of Indian general arrangement drawings from India and beyond on 1400 strong FrankeSS disk, including gear, power plants, power plants, armoured vehicles, dimensions, weights, lengths, and performance for a good range of aircraft.

INDEXED. Complete, detailed indexes
 _____ Rev. ed. 1st. 1971

1994-95 edition bigger and better than ever —

- New 1995 breakdowns showing the state of the U.S. real estate market by nation
- Directory 125,000 real estate companies listed by state and city
- Property market value

SEE THIS TOO
10 DAYS FREE

WATERPURY HILL SCHOOL CO.,
1000 W. 10th St., W. R. C. 100

ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED
DATE 08-03-2001 BY 60322 UCBAW/SJS

There is

Year	2004	2005	2006
2004	100	100	100
2005	100	100	100
2006	100	100	100

Position of 100

(Type other numbers in 0-9, only)

Adams-Rite Mfg. Company Agency—The Star Company	8	MacGee Mfg. Park Co. Inc.	10
Agency Corporations, The Agency—Hanson & Co., Inc.	53	Manassas Chemical Co.	Second Class
Acadell Radio Corp. Agency—Radio Streaming Mass. Adv.	5	Martens Associated Corp. Agency—J. Beach & Sons	41
Adair Products Corp. Agency—Charles M. Cox & Sons	53	New Duxbury Co., C. M. C. Agency—West First-Quarter East. Inc.	1
Adair Soap Products Co. Agency—Ford Large Associates Inc.	25	North American Bureau, Inc. Agency—Baker, Burns, Duxbury & O'Brien, Inc.	1
Advertising Salesmen Bureau Ltd. Agency—Goldblatt Bros.	8	Pedestal Electric Div., C. M. C. Agency—Coughlin & Co.	11
Beards Products Div. of Beards Industries Corp.	Third Class	Parker Appliances Co., The Agency—Fisher & Smith & Rose Inc.	11
Agency—McNiece John & Adams, Inc.		Pine Products Company Agency—Fisher & Smith & Rose Inc.	11
Beards Radio Div. of Beards Industries Corp. Agency—McNiece John & Adams, Inc.	65	Punka Refrigerator Corp. Agency—J. D. Day & Son	41
Best Foods Gas Works Agency—Kendrick, Meyer & Pitts Inc.	22	Pittsburgh Pipe Glass Co. Agency—Baker, Burns, Duxbury & O'Brien, Inc.	36
Cammerford Steel Rolling Co. Agency—Ford Brothers Adv.	56	Pleash-Tell Chemicals Agency—Ward & Grogan & Co.	4
Centrifugal Lubricating Agency—Lashley Advertising	42	Prote-Tech Agency—Ward & Grogan & Co.	4
Central Products Inc. Agency—George Blaise Martin Associates	46	Seawright Screens	17, 48, 51, 58, 51
Chemical Engineering & Mfg. Corp. Agency—West Mangan, Inc.	28	Sage-On Trench Corp. Agency—The Central Record Co.	41
Ever Standard Oil Co. Agency—McNiece Brothers, Inc.	25	Union Radio Bearing Co. Agency—Baker, Burns, Duxbury & O'Brien, Inc.	21
Fish Bros. Gas & Machine Corp. Agency—The Boston Company	Fourth Class	True World Sales, Inc. Agency—Baker, Burns, Duxbury & O'Brien, Inc.	41
Garret Corporation, The, Winona Mfg. Co. Agency—J. Walter Thompson Co.	3	United States Telephone Corp.	25
Graham-Turn & Babbin Co., Inc. Agency—Kallman Agency, Inc.			
Heli-Graf Corp. Agency—John Martin Lupton Co.	36		
Infant Gas Works Agency—J. E. Parker & Co.	45		
Inspect Company, Inc. Agency—Vernon Dugdale & Co., Inc.	44		
Lewis Aircraft Corp. Agency—Kendrick, Meyer & Pitts Adv.	8		

LETTERS

Suppressed Antennas

As a member of a group which has been actively engaged in research and development work on suppressed (or first mentioned) aircraft antennas for some time, I was pleased to see the publisher print this important item in the Jan. 1 issue of *Aircraft Week* ("Failures of Suppressed Antennas," pp. 36-37). I am writing to tell you that with few exceptions it is an otherwise excellent article.

The statement a made that "in all their efforts, each work best when they are long outside (the antenna)." This is not, in general, true. As an example of correct portable equipment, the tail fin RF antenna demonstrated by the Communications and Navigation Laboratory at Wright Field is an actual application in a C-119 in single form as efficient from the point of view of electrical power transfer alone as the fixed-wing RF antenna normally is adapted to this mode.

A satisfactory single-suppressed RF antenna on this mode must first have shown by our tests to provide electrical performance at least as good as that of a 140 foot tail fin antenna. Second, suppression of the RF antenna must be consistently equal or exceed the electrical performance of their externally mounted performance.

Latter in the same paper it is stated that "a suppressed (tailfin) designed for one type of aircraft can only be used for any other type of aircraft." This may be true in certain instances, if the statement is strictly qualified, but it is not valid as a general statement. Since suppressed antennas, by design, are not seen infinitely as they do in the tail fin to reduce the corresponding external antenna, this method design must be based on the aircraft which they are to be applied. However, it is simple that adaptation to a new aircraft is essentially a "cut-and-try" procedure. It is to be anticipated the design problems involved in the suppression of the antennas made in this field in recent years.

It is interesting to note that an U.S. civil aircraft is present production incorporates suppressed antennas for more than a small fraction of the total components on which it is based, on the other hand, have completely equipped for two antennas (as noted in the article, and the Canadian has demonstrated) a similar accomplishment in the few years.

V. N. CHAMBER, Supervisor
Aircraft Radio-Comm Systems Laboratory
Standard Research Institute
Stanford, Calif.

Flying Ants

The story about the Feltos' airplane in *Aircraft Week* (Jan. 15) again in confirmation of "Flying automobiles" prompts this letter. I am afraid that the editor of confirmation for an automobile that is occasionally more concerned than about confirmation of a lightplane.

This all refers to the old question of what is a "mobile airplane" and what is a "Flying automobile." Firstly, the use of the term "mobile" is wherever, but for lack of a better definition, we have been dealing on the basis of basic ability and mobility.

In the case of the Aircor, we have built a machine which is completely mobile as you point out in your story. The one that has not been put across to the public is the matter of safety.

This has to do with whether the machine is basically an airplane or an automobile. The latter only considerations such things as highway code compliance, flexibility, basic engineering data such as steering and design as related to road conditions for most of the matter of safety.

As you can see, the problem is complex, and to put it into a simple sentence, we must be whether the intent is going to use the machine as a means of transport or whether it is going to use it as a means of transport. The latter considerations of mobility, of course, only in a general sense to do with the problem.

When we have your wings, or put them on top of your car as some concepts of "flying cars" do, then you have the problem of a lot of new problems of basic engineering. The whole thing really seems a big problem for the CAA and, in your case, as when the CAA starts confining an automobile (not an airplane) in that way, they are taking off a big responsibility.

Take for instance the basic problems arising from one owner operating his automobile as that of a 25 percent of the time and only flying 10 percent. In fact, these numbers clearly show that it is not correct to say that they will control and a rule alone 15 percent may more or less answer it.

We have found that a lot of problems are not in their equipment. It all begins on the way we use as a basis of operation, an automobile, and also on the way they think the degree of automation to make road conditions, etc. I am sure you have the problems of just such light operations as contrasted with actual power are far a standard lightplane. Multiply that for the needs of emergency, reduced control, etc. and then think of how long a certified pilot landing gear will last before it needs rebuilding, or how long a set of tires on a conventional Cessna 140 will last even on an airport. Then you begin to appreciate the difficulties of certification for such a vehicle.

All this has been taken up with the CAA since we began to have before of parts which had passed CAA static test requirements. This was first method in the first wing gear. Two years of operation have checked out the fuel tanks, and a dozen other things have shown up. The result of all this is that both the CAA and the FAA have reviewed the situation and we believe that more than a dozen certifiers of the machine as an aircraft is going to be required.

Accordingly, the CAA has suggested, and we agree, that a number of flying automobiles will have to be certified before anyone can say just what the requirements for certification of such a machine might be.

The CAA has given a step further and have given us formal approval to go ahead and build and sell a limited number of Aircor to the public for the service for road. The CAA will keep close contact with the owner to determine how the things are working out, and we reserve some responsibility for replacement of body parts, etc.

Similarly, we are in possible suspension service, or, in some cases, of suspension service. This is much like the problems presented when the helicopter was first introduced, and it was certainly apparent that as much certification as a (normal) plane was not adequate.

Since helicopters had to go into service before the AIC for them could be developed. This was justified by military use of the machine and, of course, if we can sell some flying automobiles to the Army we will get through the problem quickly.

Meanwhile, the matter of terminology came up and there is no such a thing as thinking of certification as a basic requirement for its service, anyone thinks of it as being successful before we think of it as being successful and sold to the public. Most production—no. Limited production—no.

So you see, when you say that the Aircor is the first automobile to be certified, the statement isn't as simple as it seems. The CAA and we continue agree that we can't certify the Aircor until we are through the last that it has passed the required static tests, drop tests, etc. No doubt a small number of the Aircor will be, in fact, we have not been attempting to put into that matter since the last problem in one of getting out and experience in this type of machine that first system.

The result is that we are looking to have the means necessary to build the Aircor for service to the CAA. They have asked us to supply the data and the other things to gain experience with them so that they might find out what the problems of such a vehicle might be. So far we have not been able to meet the more required. The Army Field Force has shown some interest in flying automobiles and they will probably have a public service in the rapid soon. At any rate, we are looking the Aircor back that along about April 1.

MONTELMAR, TAYLOR, President
Aircor, Inc.
Longview, Wash.

Many thanks for the information that you have provided. We are looking to have the means necessary to build the Aircor for service to the CAA. They have asked us to supply the data and the other things to gain experience with them so that they might find out what the problems of such a vehicle might be. So far we have not been able to meet the more required. The Army Field Force has shown some interest in flying automobiles and they will probably have a public service in the rapid soon. At any rate, we are looking the Aircor back that along about April 1.

MONTELMAR, TAYLOR, President
Aircor, Inc.
Longview, Wash.

The argument you had between your own and the FAA is not in your story, but in your Jan. 20 article. It is like a husband to a wife.

BOB HAZEN
Aircor, Inc., Longview, Wash.
Bickley, Ohio

Bendix Products Division

FIRST IN FUEL METERING



Helping American Aviation Lead the World

Aircor's remarkable progress during the past quarter of a century, together with the growing complexity of aircraft design, have created insurmountable new problems in fuel metering and landing gear—many as challenging that only the great creative skill of Bendix Products has been equal to the task.

In meeting these many problems, as they arose, Bendix Products has assembled the finest engineering talents and the most modern and comprehensive machinery in the industry—a fact reflected in the recognition of Bendix today as the nation's outstanding source for these vital flight components.

Engine builders and airplane manufacturers are going to let this proven combination of skill and experience solve their fuel metering and landing gear problems.

BENDIX PRODUCTS DIVISION SOUTH BEND



Appl. Inc. Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.

LEADER IN LANDING GEAR



Standard fuel metering



Standard fuel metering



Standard fuel metering



Standard fuel metering



Standard fuel metering



Standard fuel metering



Standard fuel metering



BOEING B-50



BOEING STRATOFREIGHTER



BOEING B-47



McDONNELL XF-86



CONVAIR B-36

for the Air Force

... Gears and Actuators by Foote Bros.

When airplane design grew beyond the handcraft stage, when both speeds and loads went up—up—up, transmitting the vastly increased horsepower and controlling the complicated miracles of a modern air age posed serious problems for design engineers.

From the laboratories, from the machine shops, from the heat treating department of Foote Bros., come many of the answers that enabled aircraft engineers to meet these new exacting requirements.

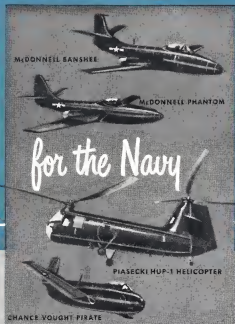
Today on America's leading aircraft, pictured here, you will find gears, actuators and power units produced by Foote Bros. They meet the demands of extreme precision, light weight, compactness and above all, the ability to stand up under loads that in many cases, might seem excessive.

FOOTE BROS. GEAR AND MACHINE CORPORATION

Dept. AVW, 4545 South Western Blvd., Chicago 9, Illinois

FOOTE BROS.

Better Power Transmission Through Better Gears

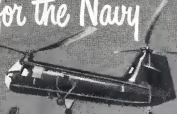


McDONNELL BANSHEE



McDONNELL PHANTOM

for the Navy



PIASECKI HUP-1 HELICOPTER



CHANCE VUGHT PIRATE



CONVAIR LINER



LOCKHEED CONSTELLATION

for Commercial Air Lines



BOEING STRATOCRUISER



DOUGLAS DC-6